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SD Department of Transportation
Office of Research

Assessment of Intermodal Transportation Information Needs

Study SD93-11
Final Report

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16. Abstract

The objectives established for this project centered on the types of data that should be collected for the Department's intermodal management system and how they should be used, the identification of key intermodal issues in South Dakota, and the development of recommendations for collection and management of intermodal transportation information.

The report includes reviews of pertinent literature, ISTEA intermodal management system requirements as established by interim final rule making, and recommendations as to the types of data to be collected, basic techniques to be used in their collection and analyses, recommendations as to the organizational assignments that should be made, and staffing recommendations.

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Chapter One

Introduction

The objectives for this project, as established by the South Dakota Department of Transportation (SDDOT), are:

1. To characterize the types, quantity, extent and importance to economic development, and other pertinent aspects of intermodal freight and passenger transportation in South Dakota.
2. To identify key issues related to development and use of intermodal transportation in South Dakota.
3. To delineate categories, sources, availability, cost and value of information required for short- and long-range intermodal planning and to meet ISTEA's requirement for an intermodal management system.
4. To develop recommendations for collection and management of intermodal transportation information in the Department of Transportation.

The project RFP (request for proposals) established eight tasks to be completed to realize project objectives. They were as follows.

Task 1

Review literature on intermodal transportation and its link with economic development on state, regional, and national levels.

Task 2

Develop a survey procedure and a list of survey contacts in South Dakota's intermodal transport community to be used to characterize the state's present intermodal freight and passenger transportation activities and their economic impact, and to identify key issues related to intermodal transportation.

Task 3

Meet with the project's technical panel to review the survey procedure and contact list.

Task 4

Perform the state intermodal survey and interpret the results.

Task 5

Identify information necessary to support intermodal transportation planning and decision-making and to satisfy requirements of the 1991 Intermodal Surface Transportation Efficiency Act, along with the sources, availability, costs, value, and analytical applications of that information.

Task 6

Develop and recommend a conceptual design for timely, efficient and cost-effective collection, maintenance and retrieval of intermodal transportation information in the Department of Transportation.

Task 7

Prepare and submit a final report summarizing the problem, literature review, research methodology, findings, conclusions and recommendations.

Task 8

Make an executive summary presentation to the Department of Transportation's Research Review Board.

Chapter Two contains the results of the literature review. National and local information sources are also identified in this chapter. Analyses and interpretations of project findings, including survey results, are presented in Chapter Three. The Consultants' conclusions and recommendations appear in Chapter Four.

Chapter Two

Publications Review

This publications review is designed to address the relationship between intermodal transportation in South Dakota (existing and potential) and the economy of the state and its regions, focusing on issues of:

- the importance of intermodal facilities and services to the economy, for both passenger and freight, by mode and type of facility or service;
- evidence about the value or payoff of intermodal investments to national, state, and regional economies;
- evidence about which information or data should be gathered in South Dakota; and
- identifying potential measures of effectiveness for intermodal transportation in order to guide decisions on what information is most useful for intermodal planning and for intermodal management systems.

The literature review surveys information which was assembled from an electronic library search, other related assignments, and publications contained in the consultants' libraries. Some of the more relevant material concerning the relationships between intermodal transportation and the economy include:

- ISTEA and Intermodal Planning: Concept, Practice, Vision; TRB Special Report 240;
- Data for Decisions: Requirements for National Policy Making; TRB Special Report 234;
- Transportation Planning, Programming, and Finance; TRC 406;
- Transport Data Needs: Programs for a New Era; TRC 407;
- Oregon Transportation Plan 1992;
- Multimodal Transportation Approaches in Minnesota;
- Multimodal Financial Planning from a Regional Perspective: A Guide for Decision Making;
- New Jersey Department of Transportation: Intermodal Planning and Programming;
- Midland Ohio Regional Planning Commission: Development of Columbus, Ohio as a Major Distribution Center—Inland Port—for the Eastern United States and Canada;
- Washington Ports and Transportation System Study;
- Characteristics and Changes in Freight Transportation Demand;
- Freight Matters: Trucking Industry Guide to Freight;
- Intermodal Planning Under ISTEA;
- Intermodal Freight Transportation;

- Statewide Planning; Intermodal Planning; Rule Making; and
- Management and Monitoring Systems; Interim Final Rule.

ISTEA and Intermodal Planning: Concept, Practice, Vision[1]

This is a report compiled by the Transportation Research Board that summarizes the principal findings of the Steering Committee for Intermodal Planning Issues Conference held in May 1992 by the U.S. Department of Transportation. The conference was convened in response to the Intermodal Surface Transportation Efficiency Act of 1991. It was the first conference cosponsored by all five modal administrations of the U.S. government. Conference sponsors included the Department of Energy, the Federal Aviation Administration (FAA), the Federal Highway Administration (FHWA), the Federal Railroad Administration (FRA), the Federal Transit Administration (FTA), and the Maritime Administration (MARAD). Participants in the conference represented all modes of transportation as well as public- and private-sector interests.

The National Conference on Intermodal Planning Issues provided one of the first national opportunities to include private-sector interests in the discussion of transport planning and policy making. Ideas on how to form a successful coalition between private- and public-sector groups were explored. The forum was the first formal opportunity for discussion on understanding and defining intermodal management systems.

The principal objectives of the National Conference on ISTEA and Intermodal Planning Issues were to:

- review the evolution of the planning and funding of the U.S. transportation system;
- identify the new planning mechanisms developed in ISTEA that mandate transportation improvement programs and intermodal transportation management systems;
- identify issues that need to be addressed in order to achieve more economically and environmentally efficient transportation systems through the optimum combined use of various modes; and
- assess how these issues need to be integrated into the planning process.

Several commissioned papers and presentations were given during the conference, which are included in the report, in order to focus the discussion on certain areas of intermodal planning and development. The participants, who represented a cross section of transportation leaders, broke off into subject-specific working groups with the objective of developing an action agenda to aid local, state and federal intermodal planning teams. The working group subject areas included:

- Intermodal Partnerships
- Multimodal Planning
- Cross-Modal Comparisons
- Intermodal Management Systems
- Vision and Potential for Intermodalism

The conclusions of the working groups, along with a summary of a panel discussions on modal planning, are included in the conference report. The subject areas of the resource papers and the conference presentations include a wide spectrum of intermodal issues. Case studies of intermodal

[1] Special Report 240, Transportation Research Board, National Research Council, 1993.

planning are presented, such as "Intermodal Experience of the California Department of Transportation" and Italy's "Intermodal Alternative: The Sea Road," along with administrative perspectives such as the Federal Railroad Administration Perspective on ISTEA and Perspective from the Office of Intermodalism. The conference proceedings offer an extensive view of the issues related to intermodal planning on the national, state, and municipal levels.

Data for Decisions: Requirements for National Transportation Policy Making[2]

This study was initiated by the Secretary of the U.S. Department of Transportation to provide an independent assessment of the data required for national transportation decision making and institutional changes required to ensure permanent data collection capabilities. The Transportation Research Board of the National Research Council was commissioned to form a committee to perform the independent evaluation of data needs. The conclusions and recommendations of the committee's evaluations are presented in the Data for Decisions publications.

The committee's study agreed with the Department of Transportation's assessment that the data sources on which transportation policy is based are seriously inadequate and that the organization of data activities in the Department of Transportation does not have the resources to provide the necessary information. The data collection by the independent modal administrations, while beneficial to the operating administration, is not structured to address the intermodal system-wide issues confronting the Department of Transportation. More coordination between the modal administrations is necessary to produce consistent complementary data sources for intermodal planning.

The principal findings and the committee's recommendations are summarized in the following paragraphs:

- Immediate establishment of a transportation data center (TDC) within DOT, preferably by legislative mandate, to provide a focal point for the compilation and integration of system-wide transportation data.
- Development of a national transportation performance monitoring system (NTPMS) by the Center to track key indicators of the nation's transportation system and its environment from the viewpoint of markets and users.
- Preparation of a biennial report by TDC on the state of the nation's transportation system, containing a summary and analysis of trends in system performance and impacts.
- Annual funding of $20 million initially to support a qualified director, full-time professional staff, and start-up for the activities of TDC, including national surveys of passenger and freight flows, and sustained long-term funding to ensure continuity of data for monitoring and policy analysis. The committee encouraged the Department of Transportation to address the recommendations immediately because of the complexity and depth of the transportation issues along with the rapidly changing environmental conditions.

The Data for Decisions report looks at the role of data in national policy making and how legislation such as the Clean Air Act of 1990 requires transportation projects to conform to air quality standards which necessitate accurate data collection. The establishment of a national performance monitoring system is a key component of the committee's recommendations and is to be organized from the perspective of the markets and users instead of individual transportation modes. The report ex-

[2] Special Report 234, Transportation Research Board, National Research Council, 1992.

plores how the Department of Transportation will meet the data requirements through the NTPMS and specific organizational issues in its development.

Finally, the committee's evaluation provides starting points for the improvement of transportation data sources which begin with the establishment of a transportation development center.

Transportation Planning, Programming, and Finance[3]

This Transportation Research Board Circular contains the proceedings of a conference held in Seattle, Washington in 1992. The conference was sponsored by the Transportation Research Board, the Federal Highway Administration, the Federal Transit Administration, and the Washington State Department of Transportation. Participants included representatives from transportation agencies, consultants, academic institutions, and private transportation firms. Major objectives of the conference were to:

- Review the emerging issues affecting planning and programming decisions, e.g., accommodating environmental criteria and implications of the recent clean air and wetlands requirements;
- Assess current and new approaches to programming and planning, including institutional and technical aspects;
- Determine the steps required to address emerging issues; and
- Develop a research agenda.

Several commissioned papers and presentations were given during the conference, which are included in the circular, to focus the attention on certain areas of intermodal planning, programming, and finance. Participants broke off into subject-specific working groups with the objective of developing an action agenda to aid local, state and federal intermodal planning and programming teams. The working group subject areas included:

- Planning
- Finance
- Programming
- Institutional

The following summarizes the working groups' principal recommendations, by subject area.

Planning

- Develop models for creation of MPO's in new urbanized areas;
- Develop methods for transportation planning in multi-regional areas;
- Identify public participation strategies;
- Study regional governance models;
- Monitor and report on institutional changes that are actually occurring;
- Identify lessons learned from certification reviews;

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[3] Transportation Research Circular, Number 406, Transportation Research Board, National Research Council, April 1993.

- Conduct case study reviews: report on success stories and interesting failures; and
- Develop a guide to sources of data, especially for goods movements.

Programming

- Define deficiency criteria and establish a common definition of transportation system deficiencies;
- Develop methods for multimodal trade-offs and priority setting; and
- Develop criteria to strengthen linkages between planning and programming.

Finance

- Develop financial forecasting models;
- Develop practical private-sector financing options;
- Identify ways to provide better, more immediate financial information;
- Develop improved models of land use and transportation linkage to identify revenue possibilities and cost reduction strategies using land-use regulations;
- Improve the mechanism for collection and sharing of the best financial plans developed by states and localities;
- Develop guidelines for improved citizen participation techniques in the financial area;
- Develop strategies for the institutional and financial use of toll roads and toll road funding; and
- Develop methods for informing the public regarding how pricing can operate as an effective method for dealing with transportation issues.

Transportation Data Needs: Programs for a New Era[4]

This document contains the proceedings of a conference held in Irvine, California, in May 1992. The conference was sponsored by the TRB Committee on Transportation Data Needs and Information Systems, the Federal Highway Administration, and the Federal Transit Administration. The conference was convened in recognition of the necessity of a major refocusing on planning requirements, and the data needed to support planning, necessitated by the Clean Air Amendments of 1990 and the Intermodal Surface Efficiency Act of 1991. Participants included transportation professionals from Federal, state and local planning groups, academicians, consultants, and researchers. Primary issues of concern to the sponsors were:

- Do traditional models and forecasting procedures provide sufficient accuracy?
- Do traditional models provide the appropriate feedback between land use and travel demand forecasting?
- What are the data requirements to support the new emphasis on intermodal planning and ISTEA requirements?

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[4] Transportation Research Circular, Number 407, Transportation Research Board, National Research Council, April 1993.

- The development and maintenance of management systems related to highway pavement, bridges, safety, congestion, public transportation facilities and equipment, and intermodal facilities and systems.

The objective of the conference was to provide guidance to states and MPO's in developing their work programs for upcoming years, which must take into account the new requirements of ISTEA and the Clean Air Amendment.

Commissioned papers and presentations given during the conference are included in the circular. Participants broke off into the following sub-specific working group areas:

- Environment,
- Management systems,
- Transportation policy, finance, and evaluation, and
- Land use, economic development, and growth management.

While the conference did not provide recommendations directly responsive to the primary concerns of the sponsors, it was generally agreed that the conference was a success because it made the participants think about the complex task of designing data programs for the states and MPO's. Research recommendations were listed in three primary areas, as follows.

Analysis, Models and Measurement

- Enhance the predictive ability of models and procedures to meet current requirements for planning based on air quality requirements and provisions of the ISTEA of 1991. Determine reasonable accuracy and precision levels of the data needed to apply the models in a cost-effective manner within the limits of current "best" practices.
- Quantify the impact of incidents (breakdowns, accidents, etc.) which cause substantial amounts of highway delay. Determine if there are factors that are common among the various random incidents in the past, as a first attempt to predict the magnitude of future incidents.
- Determine the performance measures that portray the quality of life aspects of the transportation system. An example might be the ability of inner-city people to travel to the suburbs for employment. Transportation should provide equal access to opportunities for all citizens.
- Develop a nationally coordinated approach to ascertain the degree of change in the performance of a network that would be expected from various levels of success of the various traffic demand management techniques being advocated.

Surveys and Data Collections

- Develop more cost-effective data collection methods that provide greater accuracy as required by the new clean air amendments and the ISTEA of 1991. A good example is urban vehicle counting and vehicle classifications on high-volume congested facilities.
- Determine the type and amount of goods movement data required for appropriate analytical and planning purposes, and develop the appropriate data collection methods to obtain data that can be used for analyzing the movement. The area of goods movement measurement has been a problem area for quite some time and currently requires priority attention.
- Define the methodologies for collecting information for intermodal planning purposes as recently highlighted in ISTEA.

- Promote consistency in the various data collection efforts and provide replicable information from multiple sources such as the federal efforts with the Census and NPTS data, MPO data with local travel survey, and state data with counts and classifications.
- Determine the measurements and analysis required to determine the land-use impacts and changes resulting from increased facility capacity and reduced travel time in a corridor.
- Identify the types and amounts of data needed to determine, with a reasonable degree of certainty, the degree of impact of various transportation control measures.

Education, Training and Technical Assistance

- Develop a new set of manuals to replace the set developed in the 1950s by the National Committee on Urban Transportation, and in the 1970s by the Highway Users Federation: "The Planning Process for Smaller Cities." These manuals provided considerable guidance to the professionals of the time, especially with regard to data and collection methods. This material would provide the best practices with regard to data collection.
- Provide wide distribution for state and MPO work programs, thus providing useful information for agencies to upgrade their own activities. These work programs could be collated by subject and would be a resource for others in the development of their own programs of work.
- Develop training courses to provide agency personnel with the current state of the art in survey design, collection, and analysis methods.
- A national conference should be undertaken by the Transportation Research Board every other year in which state and MPO staffs could highlight their procedures for collecting various types of data. This conference would be developed by the states and MPO's jointly and would illustrate the latest methods and procedures used in their data collection program.

Having determined that the main purpose of collecting data is to support the decision-making process, the following characteristics and factors of the "new" planning/decision-making process were presented.

- Multiple Issues—in the past, it was very much a single issue focus; today, it is a range of issues that must be addressed.
- Multiple Options—current practice dictates dealing with many different options simultaneously: TSM, TDM, HOV lanes, freeways, transit, etc.
- Time Scales—no longer planning for just a 20-year horizon as much more attention is being given to short-range needs.
- Process is Cyclic—it is no longer a linear process. It used to be four steps: land use, trip assignments, analysis, results. The process now has to take into account the impacts of facilities on land use and accessibility, and further deal with feedback loops in the process.
- Focus is on Change—but many areas are reasonably stable. The question is, do we need a complex data information system for areas that are not changing? Does the same scale of analysis apply to new facilities and old?
- Level of Detail—the process must deal with more strata and detail, which places tremendous demands on the data collection process and the planning/decision-making process. Indices and methods of presenting information to the lay person that are understandable must be developed.

- Participation—The process can be characterized as dealing with different and diverse viewpoints. It is not only the geographic area of impact, but also the people impacted by the transportation decisions. Attention must be given to the users/consumers of the system. The process must satisfy a lot of people: citizens, business people, politicians, executives. There are many decision makers, requiring that one anticipate the data needs that will satisfy all of them. It is essential to agree on the inputs to a planning/decision-making process, and the outputs.
- The nature of decisions has changed. Trade-off analyses must be made that cross the modes, including operational decisions versus capital decisions. Decisions are not strictly transportation decisions; they must be made within the quality-of-life context, and consideration must be given to both social costs and benefits. Planners must be reeducated to listen to those who are served and work to satisfy their information needs. This relates to the issue of total quality management: listening to your customers, finding out what their needs are, and adapting your processes and systems to meet those needs.
- Zero-based approach to looking at the data collection/analysis plan to determine if all of the data collected and analysis done are necessary. Are there more efficient ways of operating this effort?
- Data collection and analysis should be customer-driven and extend beyond a single year. A longer-range program is needed so that each year's program is established and evaluated in the context of a five- to six-year program.
- Identification of resources and, more important, the opportunities in addressing interagency coordination and duplication of effort. It is significant to note that the steering committee that structured the conference felt it would be possible to identify separate work programs for state DOT's and MPO's. However, each workshop independently reached the conclusion that you can not clearly differentiate between a state DOT work program and a MPO work program; they really need to be done in a cooperative, partnership manner.

Finally, it was concluded that the states and MPO's will be looking to the federal government for further guidance.

Oregon Transportation Plan 1992[5]

The Oregon Transportation plan was initiated prior to the promulgation of ISTEA. Still, it illustrates the basic steps that need to be taken for plan development, incorporating the basic elements needed for intermodal planning. A listing of some major features of the plan illustrates the planning development procedures.

1. Establish Goals and Policies
2. Complete Systems and Facilities Inventories
   - Highways
   - Rail
   - Airport

[5] The New Oregon Trail, Leading into the 21st Century, Oregon Department of Transportation, Strategic Planning Section, September 1992.

- Passenger facilities/systems
- Freight facilities systems
- Pipeline
- Bikeways
- Walkways

3. Forecast Transportation Trends
   - Population
   - Employment
   - Use of major types of transportation

3. Develop Alternative Plans
   - Base Case—continuation of existing programs with increased funding for inflation, but no change in emphasis or major funding enhancements.
   - Funding Decline—expenditures limited to those needed to preserve existing infrastructure and maintain, but not expand, current services.
   - Continuation of Existing Programs with Modal Shifts—highway expenditures maintained at the same level as the base case with additional resources shifted to other modes, as in the Livability alternative, with a revenue adjustment for inflation.
   - Livability—consolidation of an option which maximizes economic development and an option which maximizes land use and environmental benefits. Introduces development of intermodal hubs for freight and passengers;

4. Evaluations: Highway VMT; transit trips; telecommuting trips
   - Private cost per year
   - Public cost per year
   - Total cost per year
   - Economic efficiency
   - Economic development
   - Environment
   - Land use
   - Alternative modes and technologies
   - Consistency with Oregon policies
   - Safety

Multimodal Transportation Approaches in Minnesota[6]

In the United States, improved multimodal planning and operations are required to reduce transportation costs and urban congestion, and provide effective rural access. The Minnesota Department of Transportation (MN/DOT) has been actively involved in multimodal planning for several years and has incorporated it into a variety of planning activities, including their Strategic Planning process. MN/DOT's view is that an effective solution to the nation's transportation problems must be based on a multimodal family of vehicles concept. In urban areas, the new concepts must be applied in congested highway corridors. Such approaches also include the development of light rail transit and super speed trains. In rural areas, Minnesota is concentrating on its Rail Service Improvement Program. Aspects of public and legislative support, financial alternatives, and private-sector involvement also enter into the planning process.

Multimodal Financial Planning from a Regional Perspective: A Guide for Decision Making[7]

The San Diego Association of Governments (SANDAG) is a regional planning agency responsible for preparing the long-range Regional Transportation Plan (RTP) and related financial plans for the San Diego region. As in many other rapidly growing areas, transportation revenues from traditional sources have not matched the growing need for new and expanded transportation facilities and services to keep pace with growing travel demands. SANDAG has used the long-range planning process to develop the RTP as a mechanism for identifying funding shortfalls and recommending actions to obtain the revenues needed to implement the projects and programs recommended in the plan. An outgrowth of this process was SANDAG's successful establishment of a ½-percent transportation sales tax program. SANDAG is continuing to address the remaining funding shortfalls by analyzing the potential implementation of a regional development impact fee program to fund major regional transportation projects.

New Jersey Department of Transportation: Intermodal Planning and Programming

In response to the requirements of ISTEA, the New Jersey Department of Transportation is in the process of modifying its structure and procedures. The approach is similar to that used by Oregon, with the addition of computer modeling to simulate freight flows by county. This emphasis on freight appears justified considering the magnitude of international trade which terminates in or passes through the state.

Columbus, Ohio Development[8]

This report for the Midland Ohio Regional Planning Commission covers the development of Columbus, Ohio, as a major distribution center—inland port—for the eastern United States and Canada.

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[6] Transportation Research Record Number 1305; Finance, Planning, Programming, Economic Analysis, and Land Development, 1991; p 264.

[7] Ibid., p 42.

[8] Development of Columbus, Ohio as a Major Distribution Center—Inland Port—For the Eastern United State and Canada, Midland Ohio Regional Planning Commission, 1993.

As a part of its regional transportation planning activity, this agency is conducting a study to determine the feasibility of developing Columbus as an inland port. The study will develop a base case plus alternatives to evaluate the overall economic benefits resulting from the development.

Washington Ports and Transportation Systems Study[9]

The Washington Ports and Transportation Study was performed in 1991 for the Washington Public Ports Association in order to assess the freight transportation system and provide recommendations for future multimodal transportation developments. As significant portions of U.S. international trade have shifted from the Atlantic to the Pacific, Washington State ports have grown in importance to the fifth largest state in terms of waterborne tonnage. Washington's Puget Sound is North America's second largest port area for containerized freight shipments, exceeded only by Los Angeles/Long Beach. While Washington State's transportation system manages a substantial volume of freight, the complexity of the transportation infrastructure makes the intermodal planning process a difficult task. The Washington Ports and Transportation Study evaluates the state's freight transportation system and provides recommendations for multimodal planning and development.

The Washington study begins by addressing the issue of future growth of freight transportation through Washington State. Increases in freight transportation will be attributed to movement through port facilities; therefore, a waterborne commerce forecast is used to provide growth scenarios to calculate future transportation needs.

Characteristics and Changes in Freight Transportation Demand[10]

The Characteristics and Changes in Freight Transportation Demand Interim Report (NCHRP 8-30) is Phase I in a comprehensive freight transportation demand study conducted for the National Cooperative Highway Research Program. Phase I involved extensive interviews and surveys with planners and policy analysts at the federal, state, and local levels in order to identify the most critical questions in freight transportation demand, as well as the methods that have been used to address these questions in the past. The key characteristics of freight transportation demand of interest to planners and policy analysts are identified, and existing and proposed data bases are discussed.

The objectives of the NCHRP 8-30 study are to examine the changing character and composition of U.S. freight transportation demand across all modes, and to develop procedures to effectively forecast future demand. This involves macro-level analyses over time of the characteristics of transportation demand and its changes; the key economic, technological, political, and social factors that contribute to those changes; and the interaction effects between freight transportation demand and system supply. Information compiled in the study to characterize freight transportation demand and its changes over time is expected to serve other research in this area, and to provide the basis for developing a freight transportation demand forecasting process. The research products will primarily serve public decision makers, but they may also be useful to the private sector.

The NCHRP 8-30 study begins by discussing the information needs perceived by public agencies compiled through extensive interviews with representatives of public agencies and private groups. The implications of recent and proposed legislation such as ISTEA and the North American Free

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[9] Washington Public Ports Association, Seattle, Washington, 1991.

[10] Interim Report; Characteristics and Changes in of Freight Transportation Demand; Cambridge Systematics, Inc., with Leeper, Cambridge and Campbell; T.M Corsi; C.M. Grimm; June 1993.

Trade Agreement on intermodal freight are included. Key characteristics and measures of freight demand, including an extensive discussion of national freight data bases, is included in the report. The evaluation and comparison of existing and proposed data bases are included in this literature review because of the relevance in the intermodal information needs analysis.

Freight Demand Data Sources

A fundamental element of transportation system analysis and forecasting is the method and scope of freight demand measurement and description. Each source is described in terms of:

- source and availability,
- scope of coverage (mode),
- data structure and orientation,
- data collection method and source,
- coverage of specific freight demand characteristics, and
- limitations in use and coverage.

Scope and Structure

Scope of coverage can be defined relative to mode, subsystem, market or type of activity measured. Data bases typically cover one mode or several substitutable modes, and they may focus on a particular transportation subsystem (e.g., Great Lakes), type of operation (e.g., containerized vessel statistics), market (e.g., international trade), or commodity group. Figure 2-1 describes the scope of coverage of sources identified. Figure 2-2 further categorizes the sources in terms of their modal coverage, basic structure and level of detail. The multimodal sources include the Commodity Flow Survey and TRANSEARCH, which seek to capture modal share on an O/D basis. The Census foreign trade statistics distinguish vessel and air movements from total shipments, and will provide rail/truck breakdowns in future years. Multimodal sources also include those which identify, without characterizing, modal use (e.g., Directory of Importers/Exporters) or profile individual modes in standardized formats without considering modal split (e.g., National Transportation Statistics).

In Figure 2-1, several types of data bases are distinguished.

Shipment based:

- true origin-destination flows
- modal origin-destination flows

Transport based:

- modal origin-destination flows
- point activity at transportation nodes
- subsystem profile
- carrier profile
- modal profile

Other:

- Point activity at origin or destination
- commodity or market profile

Figure 2-1

Scope of Freight Data Bases[11]

Data Base	Scope of Coverage
1993 Commodity Flow Survey (CFS)	Originating shipments for all U.S. manufacturing, mining, wholesale, and selected retail and service establishments
TRANSEARCH (Reebie)	Traffic between 183 BEAs compiled from several sources
Freight Transportation and Logistics Service (DRI/MH)	Regional commodity traffic by barge, rail, and truck compiled from several sources
U.S. Imports/Exports of Merchandise on CD-ROM	Quantity and value of merchandise shipped between U.S. and foreign countries; weight for air and vessel
U.S. Exports by State of Origin (Census)	Value of U.S. exports for all modes; weight for air and vessel
U.S. Exports and Imports Transshipped via Canadian Ports	Value and weight of U.S. imports and exports to foreign countries via Canadian ports
The Directory of U.S. Importers/Exporters	Listing of U.S. companies engaged in international trade; total traffic shown when available
National Transportation Statistics, Annual Report	Activity and industry statistics by mode
U.S. Air Freight Origin Traffic Statistics (Colography)	Weight, value and number of air cargo shipments for selected top U.S. carriers
U.S. Air Carrier Traffic and Capacity (T-100) Data	Airport-to-airport domestic air freight tonnage for reporting U.S. carriers
FAA Airport Activity Statistics (T-3)	Airport air freight enplaned weight for reporting U.S. carriers
Worldwide (North American) Airport Traffic Report (ACI)	Air freight weight for ACI-member airports
ICC Carload Waybill Sample*	Sample of all rail waybills for movements terminating on U.S. railroads meeting reporting standard
Freight Commodity Statistics (AAR)	All commodity traffic for U.S. Class I railroads
North American Trucking Survey (NATS)	Truck stop sample of truck weights; predominantly long-haul truckload carriers
LTL Commodity and Market Flow Database	Weight, number of shipments, and number of pieces by traffic lane for participating carriers
Truck Inventory and Use Survey (TIUS)	Sample of daily/weekly activity for trucks (including pickups and vans) registered in each state
Nationwide Truck Activity and Commodity Survey (NTACS)	Sample of daily/weekly activity for trucks (including pickups and vans) registered in each state
Port Import/Export Reporting Service (PIERS)	International waterborne shipments entering or exiting U.S. ports (excluding some small-volume ports)
U.S. Waterborne General and Intransit Shipments	Value and weight of waterborne trade between U.S. and foreign ports; low value shipments are estimated
Waterborne Commerce and Vessel Statistics (ACOE)*	Weight and vessel trips for all domestic and waterborne movements on U.S. waterways or via U.S. ports
Ship Movements Data Base (Lloyd's)	Vessel movements on international trade routes as reported at principal world ports
World Sea Trade Service (DRI/MH)	Weight and container loads for ocean traffic on over 700 major world trade routes
Lock Performance Monitoring System (PMS)	Activity at locks owned or operated by the U.S. Army Corps of Engineers
St. Lawrence Seaway Traffic Reports	Weight and number of vessel transits on the St. Lawrence Seaway
Lake Carriers' Association Annual Report	Weight and number of vessels on the Great Lakes reported by LCA members
Exports from Manufacturing Establishments	Export value and related employment for all U.S. manufacturing establishments
Fresh Fruit and Vegetable Shipments	Fresh fruit and vegetable weight by month collected from various sources
Fresh Fruit and Vegetable Arrival Totals for 23 Cities	Fresh fruit and vegetable weight for 23 U.S. and 4 Canadian cities estimated from various sources
Quarterly Coal Report	Weight of coal shipped by all U.S. companies which own, purchase, or distribute 50,000 tons per year
Natural Gas Monthly	Shipment activity for all generating electric utilities and a sample of companies delivering natural gas to consumers
Natural Gas Annual	Activity for all companies that deliver to consumers, handle interstate movements, or are licensed to import/export
Petroleum Supply Monthly	Shipment activity by survey of U.S. refiners, blenders, plant operators, transporters ,and importers
Grain Transportation Report	Grain traffic and carloads compiled from various sources

[11] NCHRP 8-30, Interim Report, Characteristics and Changes in Freight Transportation Demand, Cambridge Systematics, Inc., with Leeper, Cambridge and Campbell, T.M. Corsi, C.M. Grimm, p. 2-51.

Figure 2-2
Mode, Type and Structure of Freight Databases[12]

Data Base	Mode[13]	Type	Level of Detail	Domestic or International
1993 Commodity Flow Survey (CFS)	M	Shipment-True O/D	NTAR-NYAR Combinations	Not Identified
TRANSEARCH (Reebie)	M	Shipment-True O/D	BEA-BEA Combinations	Not Identified
Freight Transportation and Logistics Service (DRI/MH)	M	Transport-Modal Profile	National/Regional Aggregates	Not Identified
U.S. Imports/Exports of Merchandise on CD-ROM	M	Shipment-Modal O/D	Country-U.S. Customs District Combinations	International
U.S. Exports by State of Origin (Census)	M	Shipment-True O/D	State-Country Combinations	International
U.S. Exports and Imports Transshipped via Canadian Ports	M	Shipment-True O/D	Country-U.S. Customs District Combinations	International
The Directory of U.S. Importers/Exporters	M	Other-Origin Activity	Company	International
National Transportation Statistics, Annual Report	M	Transport-Modal Profile	National Aggregates	Not Identified
U.S. Air Freight Origin Traffic Statistics (Colography)	A	Other-Origin Activity	U.S. County	Both
U.S. Air Carrier Traffic and Capacity (T-100) Data	A	Transport-O/D	Airport-Airport Combinations	Not Identified
FAA Airport Activity Statistics (T-3)	A	Transport-Point Activity	Airport	Not Identified
Worldwide (North American) Airport Traffic Report (ACI)	A	Transport-Point Activity	Airport	Both
ICC Carload Waybill Sample*	R	Shipment-Modal O/D	BEA-BEA Combinations	Both
Freight Commodity Statistics (AAR)	R	Transport-Modal Profile	Regional Aggregates	Not Identified
North American Trucking Survey (NATS)	T	Shipment-Modal True O/D	City-City Combinations	Not Identified
LTL Commodity and Market Flow Database	T	Shipment-Modal True O/D	ZIP3-ZIP3 Combinations	Both
Truck Inventory and Use Survey (TIUS)	T	Transport-Carrier Profile	Vehicle	Not Identified
Nationwide Truck Activity and Commodity Survey (NTACS)	T	Transport-Carrier Profile	Vehicle	Not Identified
Port Import/Export Reporting Service (PIERS)	W	Shipment-Modal O/D	Port-Port (Some Shipper/Consignee Locations)	International
U.S. Waterborne General and Intransit Shipments	W	Transport-O/D	Port-Port Combinations	International
Waterborne Commerce and Vessel Statistics (ACOE)*	W	Transport-Point/Subsystem Activity	Port/Waterway Segment	Both
Ship Movements Data Base (Lloyd's)	W	Transport-O/D	Vessel Trip (Port-Port)	International
World Sea Trade Service (DRI/MH)	W	Transport-O/D	Coastal Range-Coastal Range Combinations	International
Lock Performance Monitoring System (PMS)	W	Transport-Point Activity	Waterway Lock	Not Identified
St. Lawrence Seaway Traffic Reports	W	Transport-Sub-system Activity	Waterway Segment	Both
Lake Carriers' Association Annual Report	W	Transport-Point Activity	Origin Port or Lake	Not Identified
Exports from Manufacturing Establishments	N	Other-Origin Activity	State	International
Fresh Fruit and Vegetable Shipments	MC	Other-Origin Activity	State/Country	Both
Fresh Fruit and Vegetable Arrival Totals for 23 Cities	MC	Transport-O/D	State-City Combinations	Both
Quarterly Coal Report	MC	Other-O/D Activity	State/Country Combinations	Both
Natural Gas Monthly	MC	Other-O/D Activity	State/Country Combinations	Both
Natural Gas Annual	MC	Other-O/D Activity	State/Country Combinations	Both

[12] Ibid., p. 2-52.

[13] Mode: M=Multimodal; A=Air; R=Rail; T=Truck; W=Water; MC=Multimodal, Commodity Specific

The shipment-based category consists of data bases that contain separate records of individual shipments (on either a comprehensive or sample basis). The two subcategories of this category distinguish between general data bases that cover movements between production and consumption locations ("true origin-destination flows") and modal data bases that cover only (or primarily) the portion of each movement made on a specific mode. Some of the data bases in the second category (e.g., PIERS) contain some information on actual origins or destinations. Although the "true O/D" subcategory sounds like it is more specific than the "modal O/D" subcategory, for many data bases, true origins and destinations are specified only at a fairly aggregate level of detail, and usually the modal specification covers only the principal mode (or, for import/export data, the mode used for entering or leaving this country).

The transport-based category includes data bases measuring transportation flows for a modal system or subsystems. Some of these data bases provide aggregate data on transportation flows. Others provide point activity at ports, locks, terminals or border crossings without further information about movements. Measurements of freight demand within this category generally include distribution and cross tabulations over key factors relevant to the operations of a particular transport system. For example, port statistics might include breakdowns by commodity, vessel type, origin and destination but exclude detail on inland mode or shipment size distribution. Data on subsystem activity, such as inland waterways or highway segments, are similarly structured.

Summaries of activities and travel such as those provided by the Truck Inventory and Use Survey (TIUS) and the National Truck Activity and Commodity Survey (NTACS) can describe demand patterns or trends through association with vehicle miles of travel for particular types of operations, equipment types or commodities. More generalized profiles of modal activity (i.e., without carrier or network orientation) provide similar information at a regional or national level.

The "other" category consists of two subcategories. The larger of these contains data bases showing point activity at origin and/or destination but without any linkages and, except for the Cography Group's air freight statistics, without any modal detail. The last subcategory consists of a single data base, the Grain Transportation Report, which is essentially a profile of rail and water transportation of grain.

Other key factors in the definition of freight demand data bases include the level of detail, and whether or not both domestic and international shipments are covered and whether they are distinguishable.

Coverage of Commodity Characteristics

The relevance of commodity detail in freight analysis was previously described. The coverage of relevant characteristics is summarized in Figure 2-3.

The extent and method of commodity detail in individual data sources reflects the data source and its intended orientation. Trade flow data bases use product-based classification systems such as the Harmonized Schedule (HS) of Foreign Trade and the Standard International Trade Classification (SITC), while transport-oriented sources use classifications such as the Standard Transport Commodity Codes (STCC) or specialized categories of products. Commodity-specific sources may use descriptive categories unique to a particular industry and without a formal coding system, while modal point-specific sources may classify freight based solely on handling characteristics (e.g., bulk, container and breakbulk) or general services categories (e.g., air freight, express and mail).

Figure 2-3
Commodity Information in Freight Databases[14]

Data Base	Commodity Classification (Level of Detail)[15]				Comments
	Product	Producer	Transport	Other	
1993 Commodity Flow Survey (CFS)			STCC(5)	Hazmat	STTC(5) for National, STCC(3) For NTAR-NTAR
TRANSEARCH (Reebie)			STCC(4/5)		
Freight Transportation and Logistics Service (DRI/MH)			STCC		
U.S. Imports/Exports of Merchandise on CD-ROM	HS(10), SITC(5)	SIC (4)		End User (4)	
U.S. Exports by State of Origin (Census)	SITC (4)	SIC(2)			
U.S. Exports and Imports Transshipped via Canadian Ports		SIC(2)			
The Directory of U.S. Importers/Exporters	HS (4)				
National Transportation Statistics, Annual Report	HS(10), Desc.				
U.S. Air Freight Origin Traffic Statistics (Colography)					
U.S. Air Carrier Traffic and Capacity (T-100) Data		SIC(4)		Size	Shipment-size categories possible (e.g. Express, Heavy)
FAA Airport Activity Statistics (T-3)				Size or Priority	Express, Freight, Mail (priority/non-priority)
Worldwide (North American) Airport Traffic Report (ACI)				Size or Priority	Express, Freight, Mail (priority/non-priority)
ICC Carload Waybill Sample*			STCC (5)	Hazmat	
Freight Commodity Statistics (AAR)			STCC (5)		
North American Trucking Survey (NATS)			STCC (3)		
LTL Commodity and Market Flow Database				Service	Standard/Non-Standard, Special Equipment
Truck Inventory and Use Survey (TIUS)			TIUS	Hazmat	Survey Classifications
Nationwide Truck Activity and Commodity Survey (NTACS)			TIUS	Hazmat	Survey Classifications
Port Import/Export Reporting Service (PIERS)	HS (10), PIERS				PIERS groups; Full manifest description also viable
U.S. Waterborne General and Intransit Shipments	HS (6), SITC				
Waterborne Commerce and Vessel Statistics (ACOE)*			CCDWC		
Ship Movements Data Base (Iloyd's)					
World Sea Trade Service (DRI/MH)	SITC Groups				Specialized SITC groupings
Lock Performance Monitoring System (PMS)			PMS (2)		Corps-developed groups
St. Lawrence Seaway Traffic Reports	Special Groups			Toll-Based	
Lake Carriers' Association Annual Report	Special Groups				Bulk Groups, Petroleum, Grains
Exports from Manufacturing Establishments		SIC (3)			
Fresh Fruit and Vegetable Shipments	Desc.				Some grouping for low volume or mixed commodities
Fresh Fruit and Vegetable Arrival Totals for 23 Cities	Desc.				Some grouping for low volume or mixed commodities
Quarterly Coal Report	Desc.				Some commodity breakdown for physical characteristics
Natural Gas Monthly	Desc.				
Grain Transportation Report	Special Groups				Total grains; wheat, corn, and soybeans

[14] Ibid., p. 2-54.

[15] NTAR=National Transportation Analysis Region, BEA=Bureau of Economic Analysis Region, Zip3=3-digit U.S. zip code.

The influence of data users is also indicated for certain sources. The importance of monitoring hazardous material activities has resulted in special designations in some sources (e.g., the ICC waybill statistics). The increased importance of trade activity to the U.S. economy resulted in the creation of specialized, end-user codings for foreign trade, and an expansion in the concordance of trade schedules between countries.

Coverage of Origin/Destination Characteristics

Origin and destination detail is either explicitly represented in the shipment-based sources, or it can sometimes be inferred from the routing patterns of transport-based sources (see Figure 2-4). Origin and destination can be linked directly (e.g., PIERS), represented separately (Fresh Fruit and Vegetable Shipments) or represented for just one point (e.g., Colography Group origin areas). Detailed locations are generally aggregated into groupings (e.g., BEA, NTAR or ZIP), although PIERS includes actual shipper and consignee names and locations. Other O/D definitions follow political (e.g., state or county) or international boundaries.

Besides the lack of coverage and the limitations of non-shipment-based data, additional problems shown in the O/D characteristics include:

- traffic may be assigned based on billing/documentation locations or on the location where the survey information is provided, rather than the actual point of production or consumption;
- Multi-location traffic by one shipper may be assigned to a single location;
- O/D definitions may not be directly correlated with other data sources (e.g., BEA definitions vs. state-based statistics); and
- data aggregations for confidentiality purpose may prove ambiguous relative to the transport network (e.g., regional state of export data).

Coverage of Shipment Characteristics

The representation of shipment activity in the data base is based on descriptions of shipment volume, seasonality, and other factors (see Figure 2-5). The most common volume measurement is weight, which is utilized in most data sources. Total shipment value is available for the trade-related sources, and is primarily measured at the U.S. point of import or export. The Colography Group's air freight statistics are the only current domestic source measuring value, although the Commodity Flow Survey (CFS), which will not be available until 1995, will include total value.

Some of the commodity-based sources use specialized volumetric units such as bushels of grain, barrels of petroleum, and cubic feet of natural gas. The ICC Waybill Sample identifies number of carloads for each shipment. The Colography and LTL truck statistics measure the number of shipments, which is also implicitly available for shipment-based data bases such as PIERS and the CFS. The number of generic "pieces" is defined for the LTL truck source, while the number of units for specified package types are shown in PIERS. For intermodal movements, several sources identify numbers of containers or trailers (as shown in Figure 2-6).

The Census foreign trade statistics includes a unit of quantity at the most detailed commodity level based on definitions in the Harmonized Schedule (HS). These units can represent weight, dimensional measures (metric board feet), or physical units (pairs of shoes), and generally cannot be aggregated to higher commodity levels without conversion to common units. Each HS commodity can have up to two quantity definitions, although some commodities (typically high-value consumer goods) have no unit specified.

Figure 2-4

Origin/Destination Information in Freight Databases[16]

Data Base	Origin/Destination Detail	Comments
1993 Commodity Flow Survey (CFS)	State-State, NTAR-NTAR	Anticipated structure
TRANSEARCH (Reebie)	BEA-BEA	Also Canadian province detail
Freight Transportation and Logistics Service (DRI/MH)	Region-Region	For rail traffic only
U.S. Imports/Exports of Merchandise on CD-ROM	U.S.-Country	U.S. trade only
U.S. Exports by State of Origin (Census)	State/Region-Country	U.S. detail differs for 3 data extracts
U.S. Exports and Imports Transshipped via Canadian Ports	State-Country	
The Directory of U.S. Importers/Exporters	U.S.-Country	Transsphipments identified based on non-Canada shipments via Canada border
National Transportation Statistics, Annual Report	Address/City	May not assign activity correctly for multi-location companies
U.S. Air Freight Origin Traffic Statistics (Colography)		
U.S. Air Carrier Traffic and Capacity (T-100) Data	Country of origin	Colography also defines market areas relative to airports
FAA Airport Activity Statistics (T-3)		May be inferred from airport O/D
Worldwide (North American) Airport Traffic Report (ACI)		May be inferred from airport origin
ICC Carload Waybill Sample*	BEA-BEA	International shipments are identified
Freight Commodity Statistics (AAR)	2 U.S. regions	Regions based on railroad headquarters, not operations
North American Trucking Survey (NATS)	City-City	
LTL Commodity and Market Flow Database	ZIP3-ZIP3/Foreign Area	
Truck Inventory and Use Survey (TIUS)		May be inferred from registration state or states of operations
Nationwide Truck Activity and Commodity Survey (NTACS)	None on public use tape	May be inferred from registration state or states of operations
Port Import/Export Reporting Service (PIERS)	U.S. City-Foreign City/Country; Shipper	Foreign city and shipper only available for exports
U.S. Waterborne General and Intransit Shipments	U.S.-Country	May be inferred from port routing
Waterborne Commerce and Vessel Statistics (ACOE)*		May be inferred from port/waterway routing
Ship Movements Data Base (Lloyd's)		May be inferred from port routing
World Sea Trade Service (DRI/MH)	U.S.-Country	May be inferred from coastal routing
Lock Performance Monitoring System (PMS)		May be inferred from lock pool O/D based on lock-to-lock comparisons
St. Lawrence Seaway Traffic Reports	U.S., Canada, Foreign	Inferred from port of lading location
Lake Carriers' Association Annual Report		May be inferred from port of lading location
Exports from Manufacturing Establishments	State of production	
Fresh Fruit and Vegetable Shipments	State of origin; U.S./foreign destination	May only capture modal routing
Fresh Fruit and Vegetable Arrival Totals for 23 Cities	State/country of origin; city destination	23 U.S./4 Canadian cities; may only capture modal routing
Quarterly Coal Report	State/country of origin/destination	Flows by O/D pairs not available
Natural Gas Monthly	State/Country-U.S./Country	Destination use sector (e.g., utilities) also identified
Natural Gas Annual	State/Country of production/consumptions	
Petroleum Supply Monthly	Country for foreign	May be inferred from routing
Grain Transportation Report		

[16] Ibid., p. 2-55.

Figure 2-5

Shipment Information in Freight Databases[17]

Data Base	Weight	Value	Other	Seasonal Detail	Comments
1993 Commodity Flow Survey (CFS)	X	X			
TRANSEARCH (Reebie)	X				
Freight Transportation and Logistics Service (DRI/MH)	X				
U.S. Imports/Exports of Merchandise on CD-ROM	X	X	Unity Quantity	Month	Weight and value for water/air; value for all modes combined
U.S. Exports by State of Origin (Census)	X	X		Quarter	Weight and value for water/air; value for all modes combines
U.S. Exports and Imports Transshipped via Canadian Ports	X	X			
The Directory of U.S. Importers/Exporters	X	X			Shown for total trade when available
National Transportation Statistics, Annual Report	X				
U.S. Air Freight Origin Traffic Statistics (Colography)	X	X	Number of shipments		Weight/Number by shipment size categories
U.S. Air Carrier Traffic and Capacity (T-100) Data	X			Month	By cargo type
FAA Airport Activity Statistics (T-3)	X			Month	By cargo type
Worldwide (North American) Airport Traffic Report (ACI)	X				By cargo type
ICC Carload Waybill Sample*	X		Carloads	Day	Rail origination data
Freight Commodity Statistics (AAR)	X			Quarter	
North American Trucking Survey (NATS)	X				
LTL Commodity and Market Flow Database	X		Number of shipments and pieces	Month	
Truck Inventory and Use Survey (TIUS)					
Nationwide Truck Activity and Commodity Survey (NTACS)					Not available for public use tape
Port Import/Export Reporting Service (PIERS)	X	X	Number of packages by type	Day	Vessel arrival date, number of containers also available
U.S. Waterborne General and Intransit Shipments	X	X		Month	
Waterborne Commerce and Vessel Statistics (ACOE)*	X				
Ship Movements Data Base (lloyd's)				Day	Weight may be inferred from vessel capacity and assumed load factor
World Sea Trade Service (DRI/MH)	X				Number of containers also available
Lock Performance Monitoring System (PMS)	X			Month	Number of barges also available; some weekly data is published
St. Lawrence Seaway Traffic Reports	X				
Lake Carriers' Association Annual Report	X				
Exports from Manufacturing Establishments		X			Total and export shipment by type(direct, support)
Fresh Fruit and Vegetable Shipments	X			Month	
Fresh Fruit and Vegetable Arrival Totals for 23 Cities	X			Month	
Quarterly Coal Report	X			Quarter	
Natural Gas Monthly			Volume (cubic feet)	Month	Price data available
Natural Gas Annual			Volume (cubic feet)		Price data available
Petroleum Supply Monthly			Volume (barrels)	Month	
Grain Transportation Report	X		Volume (bushels)	Week	Number of carloads, price data available

[17] Ibid., p. 2-57.

Figure 2-6
Information on Modal Coverage and Equipment in Freight Databases[18]

	Modal Coverage							Equipment	
Data Base	A	T	R	IW	OW	All	Other	Intermodal	Other
1993 Commodity Flow Survey (CFS)	X	X	X	X	X		Pipeline, parcel	Container weight	
TRANSEARCH (Reebie)	X	X	X	X	X			Number of Containers	Number of Units by Mode
Freight Transportation and Logistics Service (DRI/MH)		X	X	X					Unit traffic/fleet size by mode
U.S. Imports/Exports of Merchandise on CD-ROM	X				X	X		Container weight (vessel)	
U.S. Exports by State of Origin (Census)	X				X	X		Container weight (vessel)	
U.S. Exports and Imports Transshipped via Canadian Ports							Surface total		
The Directory of U.S. Importers/Exporters							List of modes		
National Transportation Statistics, Annual Report	X	X	X	X	X		Pipeline, parcel		Vehicle Inventory
U.S. Air Freight Origin Traffic Statistics (Colography)	X								
U.S. Air Carrier Traffic and Capacity (T-100) Data	X								Aircraft departures by equipment type
FAA Airport Activity Statistics (T-3)	X								Aircraft departures by equipment type
Worldwide (North American) Airport Traffic Report (ACI)	X								Aircraft operations by type
ICC Carload Waybill Sample*			X					Number of trailers/containers	Car type
Freight Commodity Statistics (AAR)			X						
North American Trucking Survey (NATS)		X							Trailer type
LTL Commodity and Market Flow Database		X						Identified	Special equipment use identified
Truck Inventory and Use Survey (TIUS)		X							Vehicle type/configuration
Nationwide Truck Activity and Commodity Survey (NTACS)		X							Vehicle type/configuration
Port Import/Export Reporting Service (PIERS)					X			Container number, size, and volume	Vessel name
U.S. Waterborne General and Intransit Shipments					X				Tanker Identified
Waterborne Commerce and Vessel Statistics (ACOE)*					X				
Ship Movements Data Base (Iloyd's)					X				Vessel name
World Sea Trade Service (DRI/MH)					X			Container loads	Vessel type/size categories
Lock Performance Monitoring System (PMS)				X					Tow, barge type and size
St. Lawrence Seaway Traffic Reports				X				Container weight	Vessel type, class and size category
Lake Carriers' Association Annual Report				X					
Exports from Manufacturing Establishments						X			
Fresh Fruit and Vegetable Shipments	X	X	X		X	X		Piggyback Identified	
Quarterly Coal Report		X	X	X	X	X	Slurry		
Natural Gas Monthly					X		Pipeline		
Natural Gas Annual					X		Pipeline		
Petroleum Supply Monthly				X	X		Pipeline		
Grain Transportation Report			X	X	X				Rail cars, barge

[18] Ibid., p. 2-58

A major problem with foreign trade statistics for Canada and Mexico has been the lack of weight detail for modes other than vessel and air, with no value breakdown for other modes of transport. A joint program by the Bureau of Census and Federal Railroad Administration (FRA) is currently addressing this problem.

Another key shipment characteristic is the measure of traffic by time period for use in identifying seasonal or other peaking patterns. Some of the shipment-based sources such as PIERS and the ICC waybill statistics provide actual dates of shipment, although both provide transport dates as opposed to true shipment delivery dates. The detailed PMS lock records, which are available for internal Corps studies, include date and time of transit, which are also valuable in measuring peaking activity. Seasonal detail for other sources may be obtainable from the release frequency of the data. For example, Census publishes monthly foreign trade statistics, which can be used to develop general seasonal patterns, while other foreign trade data are released in quarterly form based on confidentiality requirements and economic considerations. Some sources related to highly seasonal flows (e.g., published PMS reports and fruit and vegetable statistics) explicitly present peaking patterns in reports. Several annual sources include no seasonal detail.

Coverage of Transport Characteristics

The representation of transport characteristics can be categorized by the following factors (shown in Figures 2-6 through 2-8):

- modal coverage,
- equipment detail,
- measures of transport system utilization,
- routing detail,
- carrier/service detail, and
- cost/rate information.

Modal coverage techniques include:

- single mode orientation,
- profiles of individual modes (e.g., National Transportation Statistics),
- modal distributions for origin/destination flows (CFS and TRANSEARCH), and
- appropriate modal coverage for commodity flows (e.g., fruit and vegetable data).

Equipment type information includes identification of intermodal activity or the allocation of traffic to equipment categories which are mode-specific. Container weight is typically distinguished for deepwater vessel activity (e.g., Census statistics, PIERS, and the World Trade Sea Service) in order to associate traffic with both service patterns and the requirements for terminals and handling equipment. The CFS will also identify containerized shipments and provide the only recent source for domestic and cross-border container activity. Piggyback and TOFC operations are also described for rail activity in the ICC waybill statistics and the Fresh Fruit and Vegetable Shipments.

Figure 2-7

Information on System Utilization in Freight Databases[19]

	System Utilization	
Data Base	**Point**	**Sub-system**
1993 Commodity Flow Survey (CFS)	Port of exit; weight	O/D corridor; ton-miles, weight
TRANSEARCH (Reebie)		O/D. corridor, weight
Freight Transportation and Logistics Service (DRI/MH)		
U.S. Imports/Exports of Merchandise on CD-ROM	Customs district, weight, value, quantity	Modal route, tons, value ,quantity
U.S. Exports by State of Origin (Census)	Customs district/port, weight, value	O/D, weight, value
U.S. Exports and Imports Transshipped via Canadian Ports	Customs district/port, weight value	
The Directory of U.S. Importers/Exporters		
National Transportation Statistics, Annual Report		Modal total, vehicle ton-miles
U.S. Air Freight Origin Traffic Statistics (Colography)		
U.S. Air Carrier Traffic and Capacity (T-100) Data	Airport, weight	Modal route, weight, ton-miles
FAA Airport Activity Statistics (T-3)	Airport of enplanement/departure	
Worldwide (North American) Airport Traffic Report (ACI)	Airport of enplanement/departure	
ICC Carload Waybill Sample*		Modal route, weight, ton-miles, carloads
Freight Commodity Statistics (AAR)		Modal total, weight, carloads
North American Trucking Survey (NATS)	City, O/D weight	
LTL Commodity and Market Flow Database	City, O/D weight, number of shipments/pieces	Modal route, weight, ton-miles, shipments/pieces
Truck Inventory and Use Survey (TIUS)		Modal total, vehicle miles
Nationwide Truck Activity and Commodity Survey (NTACS)		Modal total, vehicle miles, operating weeks
Port Import/Export Reporting Service (PIERS)	City, country, port, weight, value, packages	Modal route, weight, value
U.S. Waterborne General and Intransit Shipments	Port, weight, value	Modal route, weight, value
Waterborne Commerce and Vessel Statistics (ACOE)*	Port, weight, ton-miles	Waterway, weight, ton-miles
Ship Movements Data Base (lloyd's)	Port, vessel calls, capacity	Modal route, capacity
World Sea Trade Service (DRI/MH)	Coastal, weight, container loads	Modal route, weight container loads
Lock Performance Monitoring System (PMS)	Lock, weight, barges, tows	
St. Lawrence Seaway Traffic Reports		Waterway, weight, vessel GRT, transits
Lake Carriers' Association Annual Report	Port, weight, vessel calls, shipments	Modal route, weight, vessel calls, shipments
Exports from Manufacturing Establishments		
Fresh Fruit and Vegetable Shipments		Modal route, weight
Fresh Fruit and Vegetable Arrival Totals for 23 Cities		Modal route, weight
Quarterly Coal Report	Customs district/port, weight, value	
Natural Gas Monthly		Pipeline volume
Natural Gas Annual		
Petroleum Supply Monthly		Modal route, volume
Grain Transportation Report		Coast, lock, weight, units

[19] Ibid., p. 2-60

Figure 2-8
Information on Routing, Carrier, and Cost in Freight Databases[20]

	Routing			
Data Base	**Definition**	**Distance**	**Carrier Service**	**Cost/Rate**
1993 Commodity Flow Survey (CFS)	Port of exit for exports	Estimated from O/D and mode		
TRANSEARCH (Reebie)				
Freight Transportation and Logistics Service (DRI/MH)				Modal profiles
U.S. Imports/Exports of Merchandise on CD-ROM	Customs district			Import freight charges
U.S. Exports by State of Origin (Census)	Customs district/port			
U.S. Exports and Imports Transshipped via Canadian Ports	Customs district			
The Directory of U.S. Importers/Exporters	List of ports			
National Transportation Statistics, Annual Report		Average length of haul		
U.S. Air Freight Origin Traffic Statistics (Colography)	Domestic/export		Shipment size groupings (e.g., express)	
U.S. Air Carrier Traffic and Capacity (T-100) Data	Airport-airport segments	Segment miles (estimated)	Carrier	
FAA Airport Activity Statistics (T-3)	Airport of enplanement		Scheduled/non-scheduled	
Worldwide (North American) Airport Traffic Report (ACI)	Airport of enplanement			
ICC Carload Waybill Sample*	BEA O/D; interchange states	Short line miles (estimated)		Carrier revenue
Freight Commodity Statistics (AAR)				Carrier revenue
North American Trucking Survey (NATS)	City-city			
LTL Commodity and Market Flow Database	ZIP3-ZIP3	From ton-miles	Standard/non-standard	Revenue
Truck Inventory and Use Survey (TIUS)	Intra/extra state activity			
Nationwide Truck Activity and Commodity Survey (NTACS)	Number of states, highway type	Annual		
Port Import/Export Reporting Service (PIERS)	City-city/country via ports		Carrier	
U.S. Waterborne General and Intransit Shipments	Port-port		Liner, non-line, tanker	Import freight charges
Waterborne Commerce and Vessel Statistics (ACOE)*	Waterway-waterway	From ton miles		
Ship Movements Data Base (Iloyd's)	Port-port		Carrier name	
World Sea Trade Service (DRI/MH)	Coast-cost		Liner/non-liner	
Lock Performance Monitoring System (PMS)	Lock			
St. Lawrence Seaway Traffic Reports	Waterway sections		Flag of carrier	Revenue
Lake Carriers' Association Annual Report	Intra-lake port-port		Flag of carrier	
Exports from Manufacturing Establishments				
Fresh Fruit and Vegetable Shipments	State/country origin domestic /international			
Fresh Fruit and Vegetable Arrival Totals for 23 Cities				
Quarterly Coal Report	Customs district (international only)			
Natural Gas Monthly	Pipeline company		Pipeline company	Company financials
Natural Gas Annual				
Petroleum Supply Monthly	U.S. region-region			

[20] Ibid., p. 2-61

Summary of Findings

Portions of the summary of findings from the Phase One research done under NCHRP 8-30 are directly applicable to the Department and its efforts to define and implement an intermodal management system. They are:

- Most of the states and MPO's surveyed indicated that they had little or no experience in freight forecasting, although many are currently seeking to improve their knowledge and expertise in freight issues either through additional staff, consultant support, or staff training programs.
- If forecasting aids are going to be picked up and used by individuals in state DOTs and MPO's, they must be easy to apply.
- At this point in time, there is no single publicly available freight database that can be used to address a large share of the freight information and forecasting needs of public agencies across the nation.
- In contrast to conventional forecasting processes (in which the objective is to establish a single "most likely" forecast based on a given set of assumptions), more emphasis should be placed on defining a range of possible futures and assessing their likelihood.[21]

Freight Matters: Trucking Industry Guide to Freight and Intermodal Planning Under ISTEA[22]

"Freight Matters: Trucking Industry Guide to Freight and Intermodal Planning Under ISTEA" is a study prepared by the Trucking Research Institute and the American Trucking Association Foundation addressing the issues of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) on interstate systems and intermodal transportation. Major changes in freight transportation are beginning to occur with the closing of the highway construction era and the passage of ISTEA legislation. The trucking industry must actively participate in the planning and decision-making process to ensure that its opinions are included in public policy. The Freight Matters Study provides an extensive assessment of the issues, which include: examination of recent legislation such as ISTEA and the Clean Air Act, description of the participation of various organizations and agencies, and guidance for the trucking industry to play an active role in freight transportation policy decisions on the state and local levels.

A new era in transportation decision making has been opened by the passage of ISTEA, which mandates significant changes in the planning and project selection requirements for federally funded transportation projects. Highway systems will no longer be guaranteed the majority of the transportation budget but will have to compete equally with other modes in order to build transportation systems that best meet the region's goals and interests. Improved management of existing transportation systems is emphasized rather than construction of new systems. The key features of the ISTEA legislation include:

- Funding flexibility,
- Decentralized decision making,
- Increased planning requirements,
- New management systems,

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[21] Ibid., pp. 2-98–100

[22] Trucking Research Institute and the American Trucking Association; Cambridge Systematics, Inc.; 1993.

- Public participation requirements,
- Consideration of clean air goals, and
- Use of advanced technologies.

The participation of various players on transportation policy has been rearranged with the enactment of ISTEA. During the last thirty-six years, while the interstate highway system was being built, the federal government almost solely controlled the major decisions regarding resource allocation as it impacts freight transportation. The ISTEA legislation changes the role the federal government has in distributing transportation funding and allows state and local authorities to make investment choices which reflect their own transportation priorities. The principal players in transportation resource allocation are:

- Metropolitan Planning Organizations (MPO's)
- State Departments of Transportation

Finally, the Freight Matters Study provides general guidance for state motor trucking association executives and motor carrier managers on building a freight and intermodal planning process under ISTEA. Freight planning at the state and municipal levels lacks the extensive experience that exists for passenger transportation planning, which has developed and progressed over the last thirty years. Management capabilities that address issues of moving and transferring freight goods are only now being developed. Reliable data sources and proven analytical methodologies are nonexistent for freight transportation and must be developed in order to facilitate the intermodal transportation process.

Intermodal Freight Transportation

Intermodal Freight Transportation is an extensive reference source and overview of intermodalism published by the Eno Foundation for Transportation and authored by Gerhardt Muller. The intent of this publication is to keep pace with the rapidly changing world economic conditions and technical innovations for government and transport interests in reevaluating transportation strategies. The trend toward a deregulated transportation industry has spurred an enormous interest in intermodal transportation planning. This intermodal reference is designed to assist transportation planners to ensure competition for domestic producers in world markets.

The study provides an in-depth examination of the intermodal transportation industry, starting with the history of intermodal transportation and the container revolution. Government regulation and deregulation of freight travel has played a significant role in the direction intermodal freight travel has taken and will take in the near future. Government legislation deregulating truck, rail, and shipping transportation modes are all important factors in understanding the intermodal transportation structure. Intermodal Freight Transportation includes descriptions of numerous types of equipment and cargo-handling facilities utilized in intermodal transportation. This resource provides extensive descriptions of the types of intermodal transportation and the roles of freight shippers, and a detailed portrait of the terminals and cargo-handling equipment.

The future of intermodal freight transportation is influenced by a number of external factors such as technological advances, deregulation, changing trade patterns, and spreading adoption of computerization and electronic communication. The Intermodal Freight Transportation document provides a general perspective on what may happen in intermodality and highlights advances that are affecting the course of intermodal freight transportation.

Statewide Planning; Metropolitan Planning; Rule Making

Sections 1024/1025 and 3012 of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) amended title 23, U.S.C., and the Federal Transit Act by revising section 134 of title 23 and section 8 of the Federal Transit Act (49 U.S.C. app. 1607) to require a continuing, comprehensive, and coordinated transportation planning process in metropolitan areas, and it adds new requirements for a statewide planning process. The FHWA and the FTA have revised their current metropolitan regulations and issued new Statewide planning regulations to implement these changes. These new rules have been issued jointly as a modification of 23 CFR Part 450 (49 CFR Part 613 was simultaneously modified by these regulations).

The provisions of the metropolitan rules apply to all metropolitan planning organizations (MPO's) serving urbanized areas with populations of at least 50,000, State transportation agencies, and publicly operated transit agencies as appropriate. The rules provide for the development of transportation plans and transportation improvement programs (TIP's) by the MPO's in cooperation with the States and transit operators. The statewide planning rules apply to all States, MPO's, and publicly operated transit agencies as appropriate and provide for the development of statewide transportation development plans and improvement programs (STIP's).

Metropolitan Planning

Significant attributes and/or changes from the pre-ISTEA metropolitan planning requirements include:

- The required metropolitan area includes the existing urbanized area and, as a minimum, the area expected to be urbanized within a 20-year forecast period. (In nonattainment areas the metropolitan planning area must encompass the nonattainment area unless the MPO and the Governor jointly agree to exclude a portion of the nonattainment area.)
- Designation of a metropolitan planning area encompassing an urbanized area with a population over 200,000 as a transportation management area (TMA). MPO's for urbanized areas under 200,000 population can request designations as TMA's. TMA's are subject to additional requirements, relating to a CMS, project selection, and certification as discussed below.
- Consideration of 15 factors in the planning process, including:
  - + increased emphasis on preservation and more efficient use of existing transportation facilities;
  - + increased emphasis on the need to alleviate or prevent the occurrence of congestion;
  - + increased emphasis on multimodal/intermodal solutions to transportation problems;
  - + increased emphasis on considering the effect of transportation solutions on land use and consistency of transportation plans with land use and development plans; and
  - + stronger linkage between transportation and environmental planning.
- Common analysis requirements for major highway and transit investments. The regulations require that a multimodal process be used to consider large-scale transportation investments. These studies can be financed through planning and capital funds. Further, they can be utilized to produce a draft environmental document at the discretion of the State, MPO and transit operators involved in the study.
- Requirement for an open planning process in which there is a free exchange of information and there are opportunities for the public and interested parties to be involved in the planning proc-

ess. As states and MPO's design their involvement processes, there must be an opportunity for comment on the proposed process. The public involvement process must include a reasonable opportunity for comment on the proposed plans and TIP's. Regulatory requirement emphasizes state and MPO design of public involvement processes that meet broadly stated Federal performance criteria.

- Development of congestion management systems as a part of the planning process in TMA's. In TMA's that are nonattainment areas for ozone and/or carbon monoxide, projects that significantly increase the capacity for single-occupant vehicles (SOV's) must result from an approved congestion management system (CMS) to be eligible for Federal funds. Such projects are defined to be the addition of a lane to an existing facility (with the exception of safety improvements or bottleneck elimination's) or construction of a new highway on a new location. Interim provisions for addressing the SOV limitation pending development and full implementation of a CMS that meets Federal requirements are included. CMS training is being developed by FHWA and FTA.

- Development of financially constrained transportation plans for at least a 20-year horizon. Where new resources are proposed to support the plan, a strategy for obtaining these new funds must be identified.

- Development of prioritized and financially constrained TIP's which are approved by both the MPO and the Governor. The TIP must specify which projects will be funded with current revenue sources and which with proposed revenue sources. In nonattainment and maintenance areas, the first two years of the TIP must be based on available and committed funds. Where proposed funding sources will be used, strategies for ensuring their availability must be identified. The preamble to the metropolitan planning regulations contains guidance on the development of financial plans for both plans and TIP's.

- TIP's must cover at least a 3-year period and be updated at least every two years.

- Projects included in the first year of a TIP are deemed "selected" for project selection purposes. Utilizing the project selection procedures specified or agreed to by the MPO, State, and transit operators, projects can be moved from the second and third years of a TIP to the first year, if a first-year project cannot be advanced (a TIP amendment is not required).

- Projects to be funded under title 23, U.S.C., or the Federal Transit Act and all regionally significant projects requiring FHWA or FTA approval must be included in the TIP's. Other regionally significant projects funded by other Federal agencies or with State/local funds must be included for information purposes (and air quality analysis purposes in nonattainment and maintenance areas).

- In nonattainment and maintenance areas, both the transportation plans and the TIP's must conform to the State Implementation Plan (SIP) for attaining air quality standards.

- Certification of the metropolitan transportation planning process by FHWA and FTA in TMA's at least every three years. Nonregulatory guidance on certification will be provided by FHWA and FTA.

- Statewide Planning. There were no statewide transportation planning requirements, either by law or regulation, prior to ISTEA. However, states have carried out statewide transportation planning activities using Title 23 highway planning and research funds and Section 8 planning funds for many years.

The ISTEA requires a statewide transportation planning process, consideration of specific factors, a long-range plan, a program of projects, opportunity for public review of the plan and program, and specific project selection procedures. These regulations implement these requirements, including the following:

- Consideration of 23 factors and coordination of planning and programming activities, plans, data, public involvement, etc., based on the scale and complexity of issues.
- Proactive public involvement, including 45 days for public review before public involvement procedures themselves are adopted, is required for the long-range plan and the STIP.
- Consideration of concerns for Indian tribal governments having jurisdiction over lands within the State.
- A Statewide Transportation Plan with at least a 20-year horizon, addressing all modes and the connections between them and reflecting metropolitan plans, is to be continually evaluated and periodically updated. Considerable flexibility is provided in content and format.
- A Statewide Transportation Improvement Program (STIP) containing at least three years of projects, financially constrained for each year, containing only conforming projects for nonattainment and maintenance areas, and only projects consistent with the Statewide Transportation Plan. The STIP must incorporate Metropolitan Transportation Improvement Programs approved by the MPO and the Governor without modification.
- The STIP must include all projects (other than planning and research type grants) funded by the Federal Transit Act or Title 23, U.S.C., and regionally significant projects which require an action by the FHWA or FTA (whether or not funded by these agencies).
- The STIP should include other regionally significant projects whether funded by Federal or non-Federal sources.
- FHWA and FTA will jointly approve the STIP, jointly approve subject to conditions, jointly approve a partial STIP or decline approval. The FHWA and FTA will notify the state of such actions. As part of the STIP review and approval process, FHWA and FTA will make a finding as to the extent that projects in the STIP are based on an adequate planning process.

Projects are to be selected from the STIP for further implementation pursuant to the applicable project.

Management and Monitoring Systems; Interim Final Rule

Section 1034 of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) required the Secretary of Transportation to issue regulations for State development, establishment, and implementation of systems for managing: highway pavement of Federal-aid highways; bridges on and off Federal-aid highways; highway safety; traffic congestion; public transportation facilities and equipment; and intermodal transportation facilities and systems. In addition, the Secretary must issue guidelines and requirements for the State development, establishment, and implementation of a traffic monitoring system for highways and public transportation facilities and equipment. This interim final rule includes the implementing regulations for the six management systems and the traffic monitoring system. The seven systems are:

1. Intermodal Facilities and Systems Management System (IMS),
2. Pavement Management System (PMS),

3. Bridge Management System (BMS),
4. Highway Safety Management System (SMS),
5. Traffic Congestion Management System (CMS),
6. Public Transportation Facilities and Equipment Management System (PTMS), and
7. Traffic Monitoring System for Highways (TMS/H).

A management system is defined as a systematic process, designed to assist decision makers in selecting cost-effective strategies/actions to improve the efficiency and safety of, and protect the investment in, the nation's transportation infrastructure. A management system includes:

- identification of performance measures;
- data collection and analysis;
- determination of needs;
- evaluation and selection of appropriate strategies/actions to address the needs; and
- evaluation of the effectiveness of the implemented strategies/actions.

Within the transportation organization of each state, procedures for coordination of the development, establishment, implementation and operation of the management systems must include:

- an oversight process to assure that adequate resources are available for implementation and that target dates in the work plan(s) are met;
- the use of data bases with a common or coordinated reference system and methods for data sharing, and
- a mechanism to address issues related to the purposes of more than one management system.

States must be implementing the management systems specified beginning in Federal fiscal year 1995 (October 1, 1994 to September 30, 1995). A state shall be considered to be implementing a management system if the system is under development or in use in compliance with the following schedule.

Intermodal Facilities and Systems Management System

- Performance measures and standards shall be established, system design shall be completed or under way, and full-scale data collection shall be under way by October 1, 1995.
- The IMS shall be fully operational and shall provide projects and programs for consideration in developing metropolitan and statewide transportation plans and improvements programs by October 1, 1996.

Pavement Management System

- The PMS for the National Highway System (NHS) shall be fully operational and shall provide projects and programs for consideration in developing metropolitan and statewide plans and improvement programs by October 1, 1995.
- The PMS for non-NHS Federal-aid highways shall be operational and shall provide projects and programs for consideration in developing metropolitan and statewide plans and improvement programs by October 1, 1997.

Bridge Management System

- Full-scale data collection shall be under way and design of the system shall be completed or under way by October 1, 1995.
- The BMS shall be fully operational and shall result in the identification of bridge needs for consideration in developing metropolitan and statewide transportation plans and improvement programs by October 1, 1996.

Highway Safety Management System

- The SMS shall be completed or under way by October 1,1995.
- The SMS shall be fully operational and shall provide highway safety strategies, actions, projects or programs for consideration in the development of the HSP, the SEP and metropolitan and statewide transportation plans and improvement programs, and for coordination and implementation in the operational activities of the state and local agencies by October 1, 1996.

Traffic Congestion Management System

- In TMA's that are nonattainment for ozone and /or carbon monoxide, the CMS shall be fully operational and shall provide projects and programs for consideration in developing metropolitan and statewide plans and improvement programs by October 1, 1995.
- In all other areas, system design shall be completed and/or under way and full-scale data collection shall be under way by October 1, 1995.
- The CMS shall be fully operational in all areas and shall provide projects and programs for consideration in developing metropolitan and statewide transportation plans and improvement programs by October 1, 1996.

Public Transportation Facilities and Equipment Management System

- Condition measures and data system structure shall be established and data collection shall be under way by October 1, 1995.
- The PTMS shall be fully operational and provide projects and programs for consideration in developing metropolitan and statewide transportation plans and improvement programs by October 1, 1996.

Traffic Monitoring System for Highways

- The TMS/H for the NHS shall be fully operational and in use (or the principal arterial system until the NHS is approved by Congress) by October 1, 1995.
- For all other public highways, other than those functionally classified as local or rural minor collectors, the TMS/H shall be in operation or under development by October 1, 1995.
- The TMS/H shall be fully operational and in use for all public highways, other than those functionally classified as local or rural minor collectors, by October 1, 1996.

Basic ISTEA System Elements

Each Management System shall, at a minimum, consist of the following components.

Intermodal Facilities and Systems Management System

- Performance measures for evaluating the efficiency of the facility/system to move goods and people, such as:

Total travel time	Cost
Volumes	Origins and destinations
Capacity	Accidents
Ease of access	Perceived quality
Average transfer time from mode to mode	

- Data collection and system monitoring
  - + Inventories.

Physical characteristics	Operational characteristics
Time	Cost
Capacity	Usage

- Efficiency evaluations.

Facility	System

- Identify and evaluate strategies, actions, projects and develop a program for short- and long-term productivity improvement of the intermodal transportation systems.

Pavement Management System

- Data collection and management
  - + Inventory of physical pavement features

Number of lanes	Length
Width	Surface type
Functional classification	Shoulder information

  - + History of project dates and types of construction.

Reconstruction	Rehabilitation
Preventive maintenance	

  - + Condition surveys.

Ride	Distress
Rutting	Surface friction

  - + Data base linking all data files related to PMS, including pavement related information reported to FHWA for the HPMS.
- Analyses.
  - + Pavement condition
  - + Pavement performance
  - + Investment

+ Network-level present and projected total cost
+ Project level investment strategies
+ Engineering evaluations as appropriate
+ Annual evaluation and update as required

Bridge Management System

- Database.
  + Inventory.
  + Inspection.
  + Cost.
- Analyses.
  + Deterioration predictions with/without intervening action.
  + Identify feasible actions to improve bridge conditions, safety, and serviceability.
  + Estimate cost of action.
  + Estimate expected user cost savings for safety and serviceability improvements.
  + Determine least-cost maintenance, repair, and rehabilitation strategies for the bridge elements using life-cycle or comparable procedures.
  + Perform multi-period optimization.
  + Use feedback from actions taken to update predictions and cost models.
  + Generate summaries and reports as needed for the planning and programming processes.

Highway Safety Management System

- Establish plans, processes, procedures, and practices to identify, implement, coordinate, and evaluate programs, projects, and activities of the following five major areas:
  + Broad base safety programs such as motor carrier, corridor, and community based traffic safety activities.
  + Hazardous or potentially hazardous highway safety problems, roadway locations and features.
  + Early consideration of safety in all highway transportation programs and projects.
  + Safety needs of special user groups in the planning, design, construction and operation of the highway system.
  + Routine maintenance and upgrading of safety hardware (including highway-rail crossing warning devices), highway elements, and operational features.
- The plans, processes, procedures and practices shall contain, as appropriate:
  + Short- and long-term highway safety goals.
  + Accountability by identifying and defining the safety responsibilities of units and positions.

    + Institutional and organizational initiatives.

- Data base.
    + Crashes.
    + Traffic (including number of trains at highway-rail crossings), pedestrians, bicyclists, drivers, highways, and medical services.
- Analyses.
    + Assess highway safety needs.
    + Select countermeasures and set priorities.
    + Evaluation of the effectiveness of activities related to highway safety performance.
- Training.
- Public information and education.

Traffic Congestion Management System

- Performance measures.
    + Extent of congestion.
    + Impact of congestion reduction strategies and mobility enhancement strategies.
- Data collection and system monitoring.
    + Duration of congestion.
    + Magnitude of congestion.
    + Effectiveness evaluations of implemented actions.
- Identification and Evaluation.
    + Transportation demand management measures.
    + Traffic operation improvements.
    + High occupancy vehicle measures.
    + Public transit capital improvements.
    + Public transit operational improvements.
    + Nontraditional modes measures.
    + Congestion pricing.
    + Growth management and activity centers.
    + Access management.
    + Incident management.
    + Intelligent vehicle-highway system.
    + Advanced public transportation technology.
    + General purpose lane additions.
- Implementation of strategies.
    + Schedule of implementation.
    + Implementation responsibilities.
    + Funding sources.
- Evaluate effectiveness of implemented strategies.

Public Transportation Facilities and Equipment Management System

- Develop asset condition measures.
  - + Safety.
  - + Efficiency.
  - + Reliability.
- Data collection and system monitoring.
  - + Asset inventory.

    Age — Condition
    Remaining life — Replacement cost
  - + Dedicated transit rights-of-way (rail and busways) at the maximum load points for the peak period, peak direction, daily time period:

    Number of vehicles — Ridership
- Identify and evaluate proposed strategies.
  - + Asset condition.
  - + Asset needs.
  - + Schedules.

    Major maintenance — Replacement
    Costs
- Implementation of strategies and projects.
  - + Costs.
  - + Funding sources.
  - + Priority.

Traffic Monitoring System for Highways

- Precision.
  - + As established by FHWA for the HPMS.
  - + As specified by the data users at various levels of government.
- Continuous counter operation.
  - + Sufficient counters of traffic volumes, vehicle classifications, and vehicle weights to provide estimates of changes in highway travel patterns. For the development of factors, such as:

    Day of the week — Seasonal adjustments
    Axle correction — Growth
- Short-term traffic monitoring.
  - + Count data for traffic volumes collected in the field shall be adjusted to reflect annual average conditions applying only for the following factors:

    Seasonal — Day-of-week
    Axle correction — Growth

- Vehicle classification activities on the NHS.
  - + On every major system segment, information on the number of the following vehicle types operating on an average day:

    Single-trailer combination trucks
    Multiple-trailer combination trucks
    Two-axle four-tire vehicles
    Buses
    Total number of vehicles

  - + Timing cycle no greater than three years.
- Vehicle occupancy.
  - + As required by authorized data users, data will be collected on the average number of persons per automobile, light two-axle truck, and bus. Such data shall be reviewed at a minimum of every three years and updated as necessary.

Chapter Three

Findings

Major project findings, as they relate to the Department's intermodal management system needs, are discussed in this chapter in four major categories—transportation and economic development; organization, staffing, and inventories; intermodal workloads and usage; and interview results.

Transportation and Economic Development

The rate and the type of a region's economic development are a function of many diverse factors, such as:

- natural resources,
- labor force size,
- labor force quality,
- taxation structure and financial impact,
- relative wage rates,
- climatic profile of the region,
- housing/construction costs,
- availability of social amenities,
- quality of the educational system,
- distance/costs to principal markets, and
- distance/costs from principal suppliers.

While the above list is not complete, it does demonstrate that the existence of efficient transportation facilities and systems is but one of many considerations that affect regional economic development. Transportation efficiency is a necessary, but not sufficient rationale, in and of itself, for economic development. The existence, or absence of any particular transportation facility and system can best be explained by historical circumstances and free market factors such as the volume and density of the demand for goods and services, and the transportation services needed to move them. Both of these factors contribute, for example, to the lack of main line freight and passenger rail service in South Dakota. Analyses of South Dakota's Gross State Product (GSP), demographic profile, and sectoral employment data help to characterize the importance to economic development of intermodal freight and passenger transportation in South Dakota.

Note: The financial data presented in this section of this chapter were adjusted, by the Consultant, to constant 1987 dollars.

Gross State Product

Figure 3-1, on the next page, shows the GSP by sector and selected subsectors for 1980, 1988, 1989, and 1990. The years shown were selected to identify longer-term trends as well as more recent ones.

In the paragraphs that follow each sector is examined to determine its response to and dependence on intermodal transportation facilities and systems. Comparison of the longer-term trends (1980 to 1990) show that the total GSP increased at an annual rate of 2.4 percent. Any sector exhibiting a consistent rate of growth in excess of 2.4 percent can be considered a dynamic sector capable of further economic development. During the latter years of the decade (1988-1990), GSP increased at a significantly higher annual rate of 4.2 percent.

Figure 3–1

South Dakota's Gross State Product

Selected Years and Subsectors

Sector	Subsector	1980	1988	1989	1990	Percent of 1990 Total	Percent Per Annum Change 1980-1990
Agriculture, Forestries, Fisheries		835	976	1,225	1,527	13.3	6.2 *
	Farms	793	911	1,161	1,456	12.6	6.3 *
	Crops				437	3.8	
	Livestock				1,019	8.8	
Mining		62	181	193	190	1.6	11.9
Construction		457	353	358	385	3.3	-1.7
Manufacturing		776	980	984	1,064	9.2	3.2
	Durable Goods	413	617	645	701	6.1	5.4
	Nondurable Goods	362	363	339	364	3.2	0.1
Transportation, Communication, Public Utilities		918	1,023	973	965	8.4	0.5
Wholesale Trade		537	676	719	709	6.2	2.8
Retail Trade		943	1,124	1,167	1,200	10.4	2.4
Finance, Insurance, Real Estate		1,779	2,457	2,595	2,450	21.3	3.3
Services		1,333	1,472	1,497	1,558	13.5	1.6
Government		1,407	1,372	1,394	1,469	12.8	0.4
TOTAL		9,047	10,615	11,106	11,518	100.0	2.4

* Not indicative of a trend. Highly variable year-to-year values.

Source: Business Research Bureau, University of South Dakota

Source: Business Research Bureau, University of South Dakota

Figure 3-2

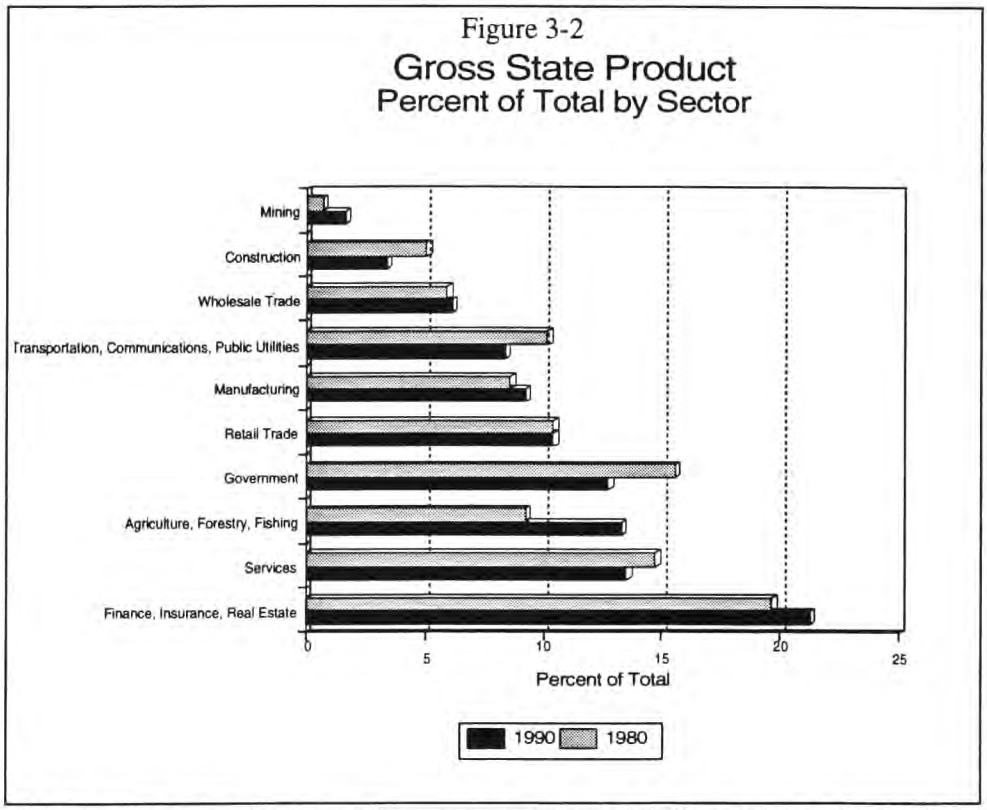
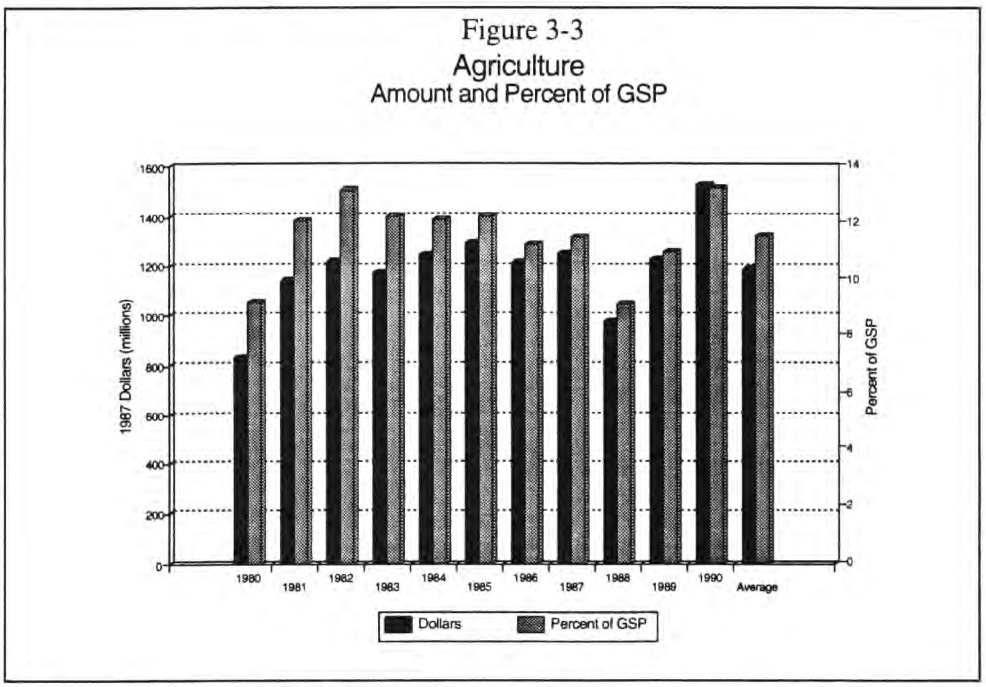


Figure 3-2 shows the percent of the total GSP by sector for 1980 and 1990. As the figure shows the most significant shifts in the composition of the GSP are in the sector increases for (1) Finance, Insurance, and Real Estate; (2) Agriculture, but as noted later this is not indicative of a trend; (3) Manufacturing; (4) Wholesale Trade and (5) Mining. The most significant decreases, in terms of their percent of the GSP were for (1) Services; (2) Government; (3) Transportation, Communications, and Public Utilities, (3) Wholesale Trade, and (4) Construction.

Figure 3-3



Agriculture, Forestry and Fisheries

This sector comprises several subsectors. Forestry and Fisheries constitute less than 1 percent of the sector's total contribution to GSP and they are not significant users of intermodal transportation. The more significant subsectors for both South Dakota and intermodal movements of products are farms and cattle. In 1990, farms and cattle generated 3.8 percent and 8.8 percent, respectively, of GSP.

Over the past fifty years, farm acreage has remained relatively constant. The Agriculture subsector evinced no discernible long-term trend (despite wide year-to-year variations in response to markets and the weather) in terms of the real dollar value of output, contributing, on the average, 11.6 percent of GSP during the last decade, as depicted by Figure 3-3, above. The relatively large growth noted in Figure 3-1, 6.2 percent per annum, is a result of a 10-year low rate in 1980 and a ten year high rate in 1990. In 1980 the sector provided about 9 percent of the GSP whereas in 1990 it provided more than 13 percent. Dollar values ranged from a low of $835 million in 1980 to the 1990 high of about $1.5 billion.

No long-term dynamic growth of this sector is anticipated but it will continue to provide a variable but important base for South Dakota's economy. The farm subsector relies on intermodal transportation (i.e., unit train facilities) to market its output. Given no change in relative fuel prices and rail pricing policy, this usage will continue into the foreseeable future.

Output of the cattle subsector, about 9 percent of the GSP in 1990, is and will continue to be transported by a single surface mode, commercial vehicles (trucks). Transportation resources of significance include live animal off and on loading facilities at both sales yards and processing plants, processed food warehousing, and refrigerated transports.

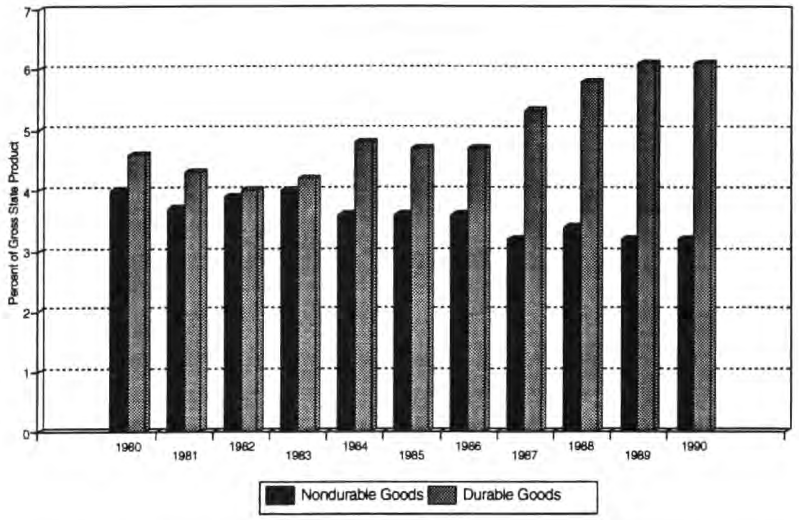
Mining

The mining sector (metals, coal, oil and gas, and nonmetallic minerals such as aggregates) had the highest sector growth rate for the 1980-1990 decade, nearly 12 percent per annum. Despite this rapid growth rate its products accounted for less than 2 percent of the GSP in 1990. Output of the Mining sector with potential intermodal interest is, generally, bulk raw material with high volume, high density, and low value characteristics. Materials transported are ideally suitable to rail transportation. Future development of this sector has no foreseeable impact on the need for major intermodal facilities and systems, even with a continuation of the rapid growth rate seen over the past 10 years.

Construction

The Construction sector experienced a decline in the real dollar value of its output during the last decade. Activity of this sector is in response to general economic activity within the region and its trading partners. The decline during the first portion of the decade reflects the stagnant economic conditions extant in the region and the United States. Robust growth during the latter years, 4.4 percent per annum from 1988 through 1990, was in response to improved conditions in the Manufacturing; Retail Trade; and Finance, Insurance and Real Estate sectors. The construction sector is not a significant user of intermodal facilities and systems given the existing and potential size of the market.

Figure 3-4
Manufacturing as Percent of GSP
Nondurable and Durable Goods

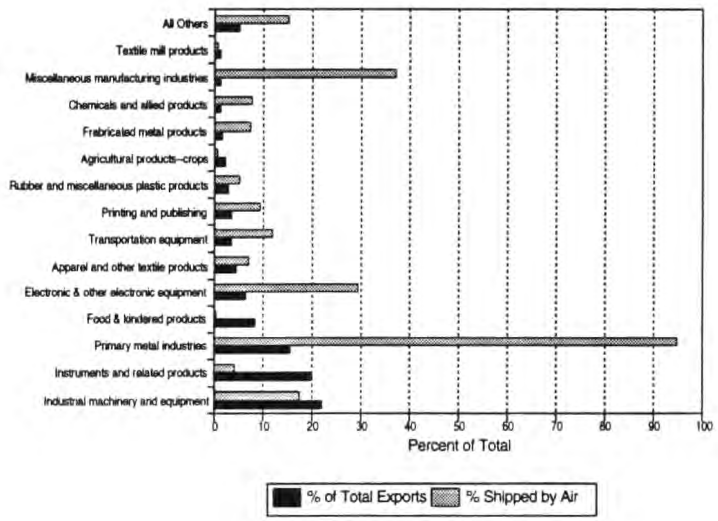


Manufacturing

During the 1980-1990 period, the manufacturing sector increased at an average annual rate of 3.2 percent. For the last three years of this period, the output of the Nondurable Goods subsector was essentially constant while the Durable Goods subsector's annual growth rate increased to 10 percent. The relative decline of the GSP importance for nondurable goods and the rapid increase in the importance of durable goods to the state's economy is shown in Figure 3-4. The largest portion of this economic development occurred in the so called hi-tech electronics area. Output and input for this subsector is characterized by high-value, low-density products suited to the commercial vehicle transport mode using recent innovations for inventory control such as just in time delivery and large centralized warehousing. These innovations also favor the use of commercial vehicles. South Dakota's lack of intermodal rail facilities apparently has not deterred economic development within the durable goods portion of the Manufacturing sector.

Railroads have recently adopted a policy of concentrating their intermodal efforts at large intermodal terminals utilizing the most recent techniques and equipment. Two such terminals are located adjacent to the eastern portion of South Dakota at Sioux City and Fargo. While intermodal shipments are an area in which railroads are forecasting large growth, this is not apparent in South Dakota even with the proximity of the two large intermodal terminals.

Figure 3-5
1992 Exports
by Standard Industrial Code



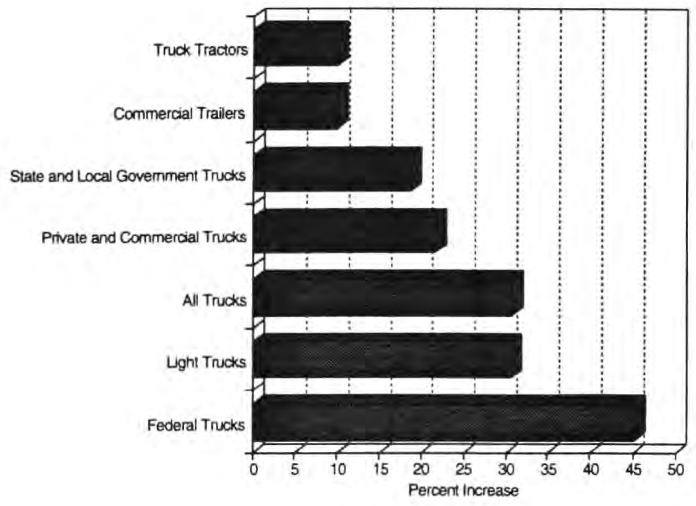
Export data, Figure 3-5, indicate that a significant portion of 1992 exports, 24 percent measured by dollar value, were transported by air. In 1992 the airports at Sioux Falls and Rapid City handled 98.9 percent of total in and out air freight shipments. The predominate portion of these shipments, 80 percent, were at Sioux Falls. Available data do not sufficiently identify the shipments to permit a determination of the portion attributable to the Manufacturing sector, except for the export data, but it seems reasonable to assume the greatest portion originates within the Manufacturing sector. Freight intermodal air facilities and systems are of importance to this sector and further economic development would be encouraged by ensuring the efficiency of air intermodality.

Transportation, Communications, Public Utilities

With the exception of the Electric subsector, which required an input of slightly more than two million tons of coal in 1992, this industry sector does not generate a large demand for transportation. Its largest subsector, Transportation, is a supplier of transportation requirements. In itself, the sector does not generate economic development, but a shortage of Transportation, Communications, or Public Utility facilities and systems could hinder the process of economic development. Such does not appear to be the case as the sector met the requirements of an expanding economy during the 1980-1990 decade while exhibiting a slight decline in the dollar value of its output from 1988 through 1990. This suggests increasing efficiency in the use of its resources.

According to Reebie Associates and the U. S. Department of Commerce, truck registrations decreased nationally by about one percent from 1982 to 1989 while the total tons of outbound and inbound manufactured freight transported by commercial vehicles increased by more than 100 percent. South Dakota's truck registration information does not reflect this long-term trend. While there was a decrease in registered private and commercial truck registrations from 1989 on the order of 3 percent (7,000 registrations), the long-term trend shows a significant increase.

Figure 3-6
Truck and Trailer Registration Growth
South Dakota for 1981 through 1991



As reported in the FHWA's Highway Statistics, private and commercial truck registrations in South Dakota grew from about 220,400 in 1981 to nearly 268,000 in 1991. The overall growth rate in truck registrations, as shown in Figure 3-6 was about 30 percent despite the decrease in registrations in the later years of the ten-year period. The only categories of truck registrations not showing this decrease were governmental—federal, state, and local agencies.

Wholesale Trade

This industry sector increased at an annual rate of 2.8 percent during the last decade, a rate lower than manufacturing but higher than retail trade, and significantly higher than construction. Without more exhaustive research, the underlying factors for this rate cannot be ascertained. It is possibly in response to recent innovations in inventory control such as just in time delivery and large centralized warehousing which increase the efficiency of operations. Both innovations favor the use of commercial vehicles for product input and output with minimal impacts for intermodal facilities and systems in a regional market area such as South Dakota (i.e., low volume, low density). This sector does not generate economic development in that demand for its output is a function of the Retail Trade outlets' demand for durable and nondurable goods.

Retail Trade

From 1980 to 1990, this sector increased its output at an annual rate of 2.4 percent, about equal to the rate achieved by total GSP. Use of just in time delivery and large centralized warehousing, as well as the need for frequent stocking of outlets, influence transportation mode choices—commercial vehicle. Future development of this sector is a function of such factors as demographic forces, employment, and personal income. Intermodal facilities and systems are not directly involved in the potential of this sector, with the possible exception of Tourism (visitor spending) which, to some extent, utilizes intermodal air and public transit. Visitor spending accrues to such Retail Trade subsectors as General Merchandise Stores, Food Stores, Automotive Dealers and Service Stations, Apparel and Accessory Stores, and Eating and Drinking Places.

Finance, Insurance, Real Estate

The GSP share of the Finance, Insurance, and Real Estate sector increased during the 1980-1990 decade by about one and a half percentage points to 21.3 percent. Most of this growth occurred during the first portion of the decade (1981 through 1987). In 1987 the sector accounted for more than 24 percent of the GSP. The overall ten-year growth rate, despite reduced GSP shares in later years, was 3.3 percent. The Banking subsector was mainly responsible for the increase in activity.

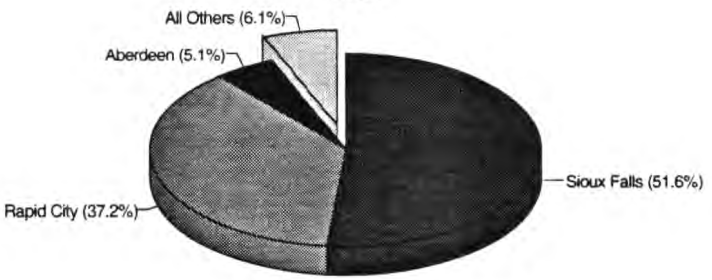
Output of this sector does not directly impact transportation demand, other than mail movements, as many of its transactions are negotiated electronically and it is likely an increasing portion will be processed electronically in the foreseeable future. Input requirements comprise office supplies and equipment delivered by commercial vehicle and information moving through mail, couriers, and electronically. Continued rapid economic development of this sector is not anticipated and, indeed, the output trend was flat during the period 1988-1990. Any future potential economic development within this sector is more dependent upon favorable taxation and regulatory polices than the intermodal facilities required to move paperwork.

Services

The Services sector, providing 13.5 percent of the GSP in 1990 and 14.7 percent in 1980, had a low average growth rate in the ten years covered by this analysis, 1.6 percent per annum. While all subsectors increased somewhat, the most dynamic included those associated with Tourism (i.e., Hotels, Motion Pictures, Amusement and Recreation), Business services, and Health services. With the exception of those subsectors linked to Tourism, the Services Industry sector has only minor impacts on intermodal transport demand. In the main input requirements are best suited to commercial vehicle delivery.

Tourism, however, affects intermodal facilities and systems in two areas, airports and public transportation (i.e., tour buses, taxi cabs, rental cars). No information was available depicting volume, average length of visit, average expenditure, or arrival mode of tourists but, as rail passenger service is not present within South Dakota, it appears reasonable to assume the greatest majority of tourists arrive by private vehicle. Mount Rushmore appears to be the top tourist attraction with about 2.5 million visitations in 1992 and qualifies Rapid City as a prime tourist destination site.

Figure 3-7
Total Air Passengers
1992



Airport passenger activity, as reported by the Department of Tourism, for 1992 is presented in Figure 3-7. Rapid City and Sioux Falls accounted for about 89 percent of all air passenger activity within South Dakota. The population of Rapid City was 54,523 according to the 1990 U.S. Census. Using this figure as some indication of resident air trip propensity, assigning 50 percent of air passenger activity to non-resident visitors appears quite conservative and results in an estimate of about 100,000 tourists arriving by air mode in 1992. If Mount Rushmore visitations can be accepted as an

order of magnitude measure of tourist volume, then about 5 percent of the tourists visiting the Rapid City area use the air transportation mode.

Figure 3-8
Visitor Spending
1993

County	Dollars (Millions)	Percent of Total
Pennington	127	28
Lawerence	60	14
Minnehaha	58	13
Custer	28	6
Four County Total	273	61
State Total	448	100

Figure 3-8 (Statistical Update, January 1994 by the Department of Tourism) shows visitor spending for the 1992-93 tourist season for the State and four counties. This dynamic sector increased at a real annual rate of 5 percent for the period from 1986 to 1992. While the above analysis of the volume of tourist air arrivals is admittedly crude, common sense supports the conclusion that air intermodal facilities and systems are of importance to this dynamic subsector.

Government

The Government sector increased at a low average annual rate of 0.4 percent, and accounted, in 1990, for about 12.8 percent of the GSP. This sector is not a generator of economic development. However, the sector is, appropriately, concerned with intermodality and supplies the finances for infrastructure construction and/or operation of certain intermodal facilities and systems, for example:

- airports,
- public transit,
- highway,
- rail, and
- highway access to airports, unit train storage facilities, and rail yards.

Failure to fund the construction, operation or timely expansion of such facilities and systems will adversely affect the economic development of South Dakota.

Demography

The urbanization trend extant in the United States is also strongly evident in South Dakota. The urban population, as defined by the U.S. census, comprises the population residing in places of 2,500 or more persons. In 1950, 33.2 percent of South Dakota's population was classified as urban while 50 percent was so classified by the 1990 census. In addition to the movement from a rural environment to the urban conurbations, South Dakota also presents a strong pattern of migration to regions outside the state. Figure A-1, in the Appendix, shows populations for all South Dakota counties for the years 1940, 1970, 1980, and 1990. As delineated therein, the state's population increased at the low rate of 0.16 percent per annum from 1940 to 1990. During the 1980-1990 decade, the United States increased its population at a rate of 2.14 percent per annum. The same rate was a meager 0.08 percent in South Dakota, and this occurred during a decade of relatively robust economic growth within the state. The reasons underlying the decision to relocate are highly individual and may include such considerations as health, social amenities, climate, and economic opportunities.

South Dakota's population is also widely scattered with a state density of only 9.2 persons per square mile. County densities range from a high of 153.0 for Minnehaha to a low of 1.1 for Ziebach. Individuals must be considered to make rational choices when selecting the location of their domicile, and the availability, or accessibility of multi modes of transportation is but one factor influencing such decisions. Public provision and maintenance of reasonably adequate transportation infrastructure, with such a scenario, present major problems to decision makers. In a free economy, the presence or absence of intermodal facilities and systems is determined by market forces and political factors. Relatively small, dispersed markets do not favor the development of intermodality as such systems, in general, require economies of scale to maintain fiscal viability.

Figure 3-9, below, identifies 17 counties that had positive growth rates in the 50-year period from 1940 through 1990. In that period, 13 counties exhibited positive growth rates from 1940 through 1970, 15 had positive growth rates from 1970 to 1990, but only 11 had positive rates from 1980 to 1990. The annual 1980 to 1990 rates of increase exceeded 1.0 percent in only five counties, and all rates were significantly lower than the annual rate of increase for the United States. Minnehaha and Lincoln in eastern South Dakota had rates of 1.2 and 1.0 percent respectively. Pennington and Lawerence in the Black Hills area of western South Dakota registered 1.5 and 1.2 percent. Todd in the south central part of the state and containing a smaller population had 1.3 percent. The remaining five positive growth counties displayed rates ranging from Codington with 0.8 percent to Yankton with 0.2 percent. Rates of decrease ranged from -1.3 percent for Shannon to -0.2 percent for Lake.

Figure 3-9
Positive County Growth Rates

	Population				Per Annum Growth Rates		
County	1940	1970	1980	1990	1940-70	1970-90	1940-90
Clay	592	12,923	13,689	13,186	10.8	0.1	6.4
Pennington	23,799	59,349	70,361	81,343	3.1	1.6	2.5
Meade	9,735	17,020	20,717	21,878	1.9	1.3	1.6
Hughes	6,624	11,632	14,220	14,817	1.9	1.3	1.6
Minnehaha	57,697	95,209	109,435	123,809	1.7	1.3	1.5
Shannon	5,366	8,198	11,323	9,902	1.7	1.3	1.5
Brookings	16,560	22,158	24,332	25,207	1.0	0.6	0.8
Todd	5,714	6,606	7,328	8,352	0.5	1.2	0.8
Jackson	1,955	1,531	3,437	2,811	-0.8	3.1	0.7
Codington	17,014	19,140	20,885	22,698	0.4	0.9	0.6
Stanley	1,959	2,457	2,533	2,453	0.8		0.4
Brown	29,676	36,920	36,962	35,580	0.7	-0.1	.04
Lincoln	13,171	11,761	13,942	15,427	-0.4	1.4	0.3
Yankton	16,725	19,039	18,952	19,252	0.4	0.1	0.3
Davison	15,336	17,319	17,820	17,503	0.4	0.1	0.3
Lawerence	19,093	17,453	18,339	20,655	-0.3	0.8	0.2
Custer	6,023	4,698	6,000	6,179	-0.8	1.4	0.1
Group Total	247,039	363,413	410,275	441,052	1.3	0.6	1.0
State Total	642,961	666,257	690,738	696,004	0.119	0.219	0.159

Figure 3-10, on the next page, shows county and city populations, and employment levels for 22 counties and 21 cities. The listed cities registered growth and decrease rates that are similar to those for their counties. These 22 counties contained 73.7 percent of South Dakota's total population in 1990. Demographic factors seldom evince abrupt orders of magnitude changes. Given the existing market size and distribution pattern, with comparatively low rates of change, it is unlikely that new intermodal facilities and systems will become financially feasible in the short run. Long range planning should provide adequate and timely warning for the need for additional intermodality infrastructure and systems.

The Department has noted the substantial aging of the state's population, a trend that is consistent with that for the population of the United States. Using 1985 census data John D. Kasarda1 estimated that:

- less than six percent of the nations population growth from 1985 to 2020 would be under the age of 45;
- there would be a 71 percent increase in the nation's population between the ages of 45 to 60;
- an 80 percent increase in the nation's population that is over 65; and
- a 160 percent increase in those who are over the age of 85.

As Mr. Kasarda noted, these trends if realized, will have many transportation policy impacts. Those of IMS significance include increased demands for public transportation and accessibility. Again trends the Department has already noted.

[1] "Populatin and Employment Change in the United States: Past, Present, and Future", A Look Ahead, Year 2020, Transportation Research Board, 1988, pp 120, 121.

Figure 3–10

Selected County and City Populations and County Employment

County	City	Population						County Employment		
		County			City					
		1980	1990	Annual % Change	1980	1990	Annual % Change	1980	1990	Annual % Change
Minnehaha	Sioux Falls	109,435	123,809	1.2	81,343	100,814	2.2	48,603	67,421	3.3
Pennington	Rapid City	70,361	81,343	1.5	46,492	54,523	1.6	23,411	29,504	2.3
Brown	Aberdeen	36,962	35,580	(0.4)	25,851	24,927	(0.4)	12,723	12,962	0.2
Brookings	Brookings	24,332	25,297	0.4	14,951	16,270	0.8	5,414	6,994	2.6
Codington	Watertown	20,885	22,698	0.8	15,649	17,592	1.2	6,791	9,360	3.3
Meade	Sturgis	20,717	21,878	0.5	5,184	5,330	0.3	1,831	3,143	5.6
Lawerence	Spearfish	18,339	20,655	1.2	5,251	6,966	2.9	5,516	7,093	2.5
	Lead				4,330	3,632	(1.7)			
	Deadwood				2,035	1,830	(1.1)			
Yankton	Yankton	18,952	19,252	0.2	12,011	12,703	0.6	7,511	8,291	1.0
Beadle	Huron	19,195	18,253	(0.5)	13,000	12,488	(0.4)	5,703	6,200	0.8
Davison	Mitchell	17,820	17,503	(0.2)	13,916	13,798	(0.1)	6,698	7,572	1.2
Lincoln	Canton	13,942	15,427	1.0	2,886	2,787	(0.3)	2,543	2,793	0.9
Hughes	Pierre	14,220	14,817	0.4	11,973	12,906	0.8	3,909	4,727	1.9
Clay	Vermillion	13,689	13,186	(0.4)	10,136	10,034	(0.1)	1,875	2,456	2.7
Lake	Madison	10,724	10,550	(0.2)	6,210	6,257	0.1	2,828	2,815	(0.0)
Union	North Sioux City	10,938	10,189	(0.7)	1,992	2,019	0.1	2,135	2,234	0.5
Roberts	Sisseton	10,911	9,914	(1.0)	2,789	2,181	(2.4)	1,362	1,675	2.1
Shannon		11,323	9,902	(1.3)				523	978	6.5
Charles Mix		9,680	9,131	(0.6)				1,384	1,628	1.6
Turner		9,255	8,576	(0.8)				935	1,272	3.1
Grant	Millbank	9,013	8,372	(0.7)	4,120	3,879	(0.6)	2,217	2,556	1.4
Todd		7,328	8,352	1.3				812	714	(1.3)
Hutchinson	Parkston	9,350	8,262	(1.2)	1,545	1,572	0.2	1,684	1,823	0.8
	Freeman				1,462	1,293	(1.2)			
Total (22 counties)		487,371	512,946	0.5	283,126	313,801	1.0	146,408	184,211	2.3
South Dakota		690,768	696,004	0.1				175,136	215,104	2.1

Sources: 1990 Census of Population and Housing
South Dakota County Business Patterns 1980, 1990

Employment

In general, employment data reflect economic activity. A perusal of such data should confirm and clarify findings emanating from the above analyses of economic and demographic data. The numbers of employees for the 1980-1990 decade are shown, by industry, in Figure 3-11, on the next page. The state economy generated a total of 32,694 additional jobs during this period, recording an average annual rate of increase of 1.4 percent. A rate which is significantly higher than the population rate of increase of about 0.8 percent for the same period.

Apparently, this increase in employment and the discontinuity between employment growth and labor supply (i.e., population increase) have continued into the 90's, as indicated by the state's unemployment rates:

- 3.1 percent in June 1992;
- 3.4 percent in June 1993; and
- 2.8 percent in March 1994.

The above rates are much lower than those recorded for the nation, which was about 6.8 percent in March 1994. Referring to Figure 3-11, the largest gains were in the sectors of:

- Services, 4.0 percent per annum;
- Banking, Insurance, Real Estate, 3.9 percent per annum;
- Manufacturing, 1.6 percent per annum; and
- Retail Trade, 1.5 percent per annum.

These sectors also achieved the greatest economic growth during the same period. The largest decrease, considering the number of positions affected, occurred in the Agriculture sector with a decrease of 4,800 employees, a reduction on the order of 14 percent of total employment, yielding an average annual decline rate of -1.4 percent. This presents an apparent anomaly in that sector output, in dollar terms, did not decrease when 1980 is compared to 1990 (even though there were intervening year decreases). The total dollar value of farm output is not only a function of the amount of crops produced and sold, but of market price as well. Still factors that could be contributing to the stability of agricultural output, with a significant reduction of persons employed, may well include a continuing increase in the average farm size, and the use of new technology.

The number of employees also decreased in the Mining, Construction, and Wholesale Trade industries. As previously shown in Figure 3-10, the 22 counties with populations of 8,000 or more as of 1990 generated 37,803 new jobs, or 94.6 percent of the total 39,968 positions added to employment rosters during the decade. Jobs were created within the state at an annul rate of 2.1 percent, less than half the rate achieved by the nation—about 4.4 percent . The following six counties accounted for about 80 percent of all additional jobs:

- Minnehaha, 18,818,
- Pennington, 6,093,
- Codington, 2,569,
- Brookings, 1,580,
- Lawerence, 1,577, and
- Meade, 1,577.

Figure 3–11

Employment by Sector

Industry	1980 Number	1980 Percent of Total	1990 Number	1990 Percent of Total	Change Number	Change Average Percent Per Annum
Services	44,698	20.2	66,011	26.0	21,313	4.0
Retail Trade	47,324	21.4	54,964	21.6	7,640	1.5
Manufacturing	27,261	12.3	32,103	12.6	4,842	1.6
Agriculture, Forestry, Fisheries	35,841	16.2	30,979	12.2	(4,862)	-1.4
Finance, Insurance, Real Estate	11,043	5.0	16,215	6.4	5,172	3.9
Wholesale Trade	17,404	7.9	15,938	6.3	(1,466)	-0.9
Transportation, Communications, and Public Utilities	12,489	5.6	13,007	5.1	518	0.4
Public Administration	12,610	5.7	12,697	5.0	87	0.1
Construction	9,818	4.4	9,724	3.8	(94)	-0.1
Mining	2,748	1.2	2,292	0.9	(456)	-1.8
Totals	221,236	100	253,930	100	32,694	1.4

Source: County Business Patterns, 1980--1990
US Bureau of the Census

Figure 3-12, on the next page, presents 1980 and 1990 employment data by industry for these six counties, grouped by geographic location. Note however that industry definitions for data shown therein are not identical to the sectors in the GSP accounts. For example, Agriculture does not contain those employees working directly on the farms and with livestock. Further, the Government sector is not presented.

Within the Black Hills region, again as shown in Figure 3-12, the dominant employment sectors in 1990 were:

- Services which provided nearly a third (30.7 percent) of reported jobs in the area and had an average annual growth rate over the past ten years of 4.8 percent per annum.;
- Retail trade which provided more than a quarter of the area's jobs (27.8 percent) and had a growth rate of 2.8 percent per annum; and
- Manufacturing with 12.4 percent of the jobs and a growth rate of an average of 1.6 percent per annum.

These three sectors provided well over two-thirds of the reported jobs in these three counties in western South Dakota in 1990. However, Agriculture's share of total employment, as earlier noted, is understated.

Figure 3-12 also shows how shares of total regional employment shifted significantly by sectors. Comparisons of 1980 and 1990 show:

- Services with a 5.9 percentage point increase;
- Transportation, a 3.5 percentage point decrease;
- Mining, a 1.7 percentage point decrease,
- Finance, a 1.6 percentage point decrease;
- Wholesale Trade, a 1.2 percentage point decrease, and
- Retail Trade, 1.0 percentage point decrease.

The higher rates of growth in the Retail Trade and Services sectors, as shown in the last column of Figure 3-12, most probably reflect the impact and importance of Tourism within the region.

Within the Eastern region (Minnehaha, Brookings, Codington), the same three sectors dominated employment, in 1990, with a fourth sector playing a more significant role in terms of both percent of total employment and growth:

- Services, which again provides nearly one third of the area's reported jobs (29.4 percent) and had an average annual growth rate of 4.8 percent over the decade covered by the analysis;
- Retail trade provided 23.5 percent of the jobs with a growth rate of 2.8 percent per annum;
- Manufacturing had 16.3 percent of the jobs with a growth rate of 1.9 percent per annum; and
- Finance, Insurance and Real Estate provided more than ten percent of the area's total reported employment and had a growth rate of over 8 percent per annum.

Figure 3–12

Employment for Selected Counties by Sector

Region Industry	1980 Number of Employees	1980 Percent of Total	1990 Number of Employees	1990 Percent of Total	Average Percent Per Annum Change
Black Hills Area (Western South Dakota--Pennington, Lawerence, Meade):					
Services	7,621	24.8	12,198	30.7	4.8
Retail Trade	8,863	28.8	11,029	27.8	2.2
Manufacturing	3,737	12.2	4,928	12.4	2.8
Construction	2,251	7.3	2,650	6.7	1.6
Transportation, Public Utilities	2,109	6.9	2,149	3.4	0.2
Wholesale Trade	2,009	6.5	2,119	5.3	0.5
Mining	1,966	6.4	1,885	4.7	-0.4
Finance, Insurance, Real Estate	1,806	5.9	1,708	4.3	-0.6
Unclassified	303	1.0	882	2.2	11.3
Agriculture, Forestry, Fishing	95	0.3	192	0.5	7.3
Black Hills Area Totals	30,758	33.6	39,740	32.2	2.6
Eastern South Dakota (I-29--Minnehaha, Brookings, Codington):					
Services	15,345	25.3	24,592	29.4	4.8
Retail Trade	14,854	24.5	19,677	23.5	2.8
Manufacturing	11,254	18.5	13,625	16.3	1.9
Finance, Insurance, Real Estate	3,952	6.5	8,770	10.5	8.3
Transportation, Public Utilities	5,732	9.4	6,181	7.4	0.8
Wholesale Trade	5,911	9.7	6,107	7.3	0.3
Construction	3,177	5.2	3,559	4.2	1.1
Unclassified	358	0.6	945	1.1	10.2
Agriculture, Forestry, Fisheries	83	0.1	243	0.6	11.3
Mining	54	0.1	76	0.1	3.5
Eastern Area Totals	60,736	66.4	83,775	67.8	3.3
Totals	91,494		123,515		3.0

Source: County Business Patterns, 1980,1990, U.S. Bureau of the Census

Significant ten-year shifts in total employment by sector are also seen in this area:

- Services had a 4.1 percentage point increase;
- Finance had an nearly equal job share increase (4.0 percentage points); while
- shares for the other major sectors all showed decreases—2.4 percent for wholesale trade, roughly equal reductions in manufacturing and transportation (2.2 and 2.0 percent), and construction and retail trade were both down about one point.

In addition to the three dominant sectors, the Finance industry also enjoyed robust growth in employment during the decade.

An inter-regional comparison discloses that the two regions present rather similar profiles, with the same employment sectors dominant:

- Manufacturing—smaller percentage share in the Black Hills,
- Retail Trade—larger percentage share in the Black Hills and
- Services—slightly larger percentage share in the Black Hills.

A comparison of growth rates between these two areas shows:

- Manufacturing increasing at about the same rate,
- Finance having a much larger rate of increase in the eastern counties,
- Retail Trade and the Services sectors have similar growth rates, and
- total employment in the eastern region increased at a slightly higher rate—3.3 percent as opposed to 2.6 percent in the Black Hills.

Summary

At this level of analyses, conclusions may be somewhat speculative. However, some generalizations are possible and appear reasonable. Intermodal air passenger facilities and systems have a significant impact on economic development in both regions. A significant portion of air passengers are most probably tourists in the Black Hills region while it is reasonable to generalize that business travelers predominate in the east. From this, monthly passenger records can be reviewed to ascertain peak terminal loading data for terminal sizing implications. Terminal loading should be more stable throughout the year in the eastern region while seasonality might be expected in the Black Hills.

Comparing the relative size and importance of the Manufacturing industries, intermodal air freight facilities and systems should be of greater importance and hence should be afforded closer surveillance in the eastern region. A recent newspaper article confirms this finding[2]. It says that the amount of cargo flown out of the Sioux Falls Regional Airport nearly tripled in 1993 and is growing at an even faster pace this year. The article goes on to note that the airport authority has expanded freight facilities and that shippers, UPS and Federal Express, have expanded their cargo capacities significantly. In addition Airborne Express recently started a Sioux Falls operation.

A comparison of population migration patterns within the state, as previously discussed, reveals a positive relationship between population growth and economic opportunity as the above listed six

[2] "Air Cargo Traffic Increases", Sioux Falls Argus Leader, June 19, 1994.

counties also captured the largest population increases during the decade. In 1990, the six counties comprised about 42.5 percent of the state's population.

A consideration of the quite low unemployment rates within South Dakota and the continuing migration of its residents to regions beyond the state boundaries, skilled labor force shortages will probably constitute the most significant impediment to the pace of economic development in the short and medium run.

South Dakota's economy, as measured by GSP, is increasing, but at a rate less than that for the entire United States. The Agriculture, Forestry, Fisheries industry generates a major portion of GSP, nearly 12 percent on the average during the decade 1980 - 1990. However, this sector's proportionate share is decreasing over time and its real dollar output, highly volatile from year to year, is rather flat with no perceivable trend. Those sectors evincing a potential for the generation of further economic development are:

- Mining,
- the Durable Goods subsector of Manufacturing, and
- the Tourism subsector of Services.

Marketing of the output from the Mining industry does not impact intermodal facilities and systems. Output and input for the Durable Goods subsector are most suited to transportation by commercial vehicles and air. The Tourism subsector does impact intermodal facilities and systems in that an estimated 5 percent of the tourists to the Rapid City area arrive via air.

South Dakota's population is increasing at a very low rate. During the 1980-1990 decade the rate of increase decreased even further to a lethargic 0.08 percent per annum. Such a low rate of increase, considerably below the birth rate, is indicative of a relatively large migration to other regions beyond the state's borders. The population is sparse and widely dispersed with an overall density of 9.2 persons per square mile. The two principle population centers of Sioux Falls and Rapid City are relatively small from the aspect of ridership generation required to support extensive rail or bus mass transit intermodal facilities and systems. The same financial considerations apply to expectations for significant increases in direct commercial air connections and more frequent flight schedules to hubs other than Denver and Minneapolis, and to a lesser degree Chicago and Dallas/Forth Worth.

The employment analyses supports the economic development potential derived from the economic analyses in that similar sectors dominate the employment profile. The employment data also permitted a small area broad brush analysis, grouping six counties into two regions that generated about 80 percent of the additional jobs added to the employment roster during the 1980-1990 decade. Under the efficient use of resources principal, these two regions should receive a significant surveillance effort if economic development is the primary goal.

Considering an unemployment rate of 2.8 percent, a shortage of skilled labor will undoubtedly prove to be a greater impediment to economic development than any real deficiency of modal or intermodal transportation facilities and systems in the short and medium term.

Intermodal issues impacting economic development and amenable to financially responsible and economically feasible solutions are most likely to appear in the following areas:

- Agriculture—unit train loading facilities and access;
- Air passenger terminal access and facilities at Rapid City and Sioux Falls; and
- Air freight terminal access and facilities, also at Rapid City and Sioux Falls.

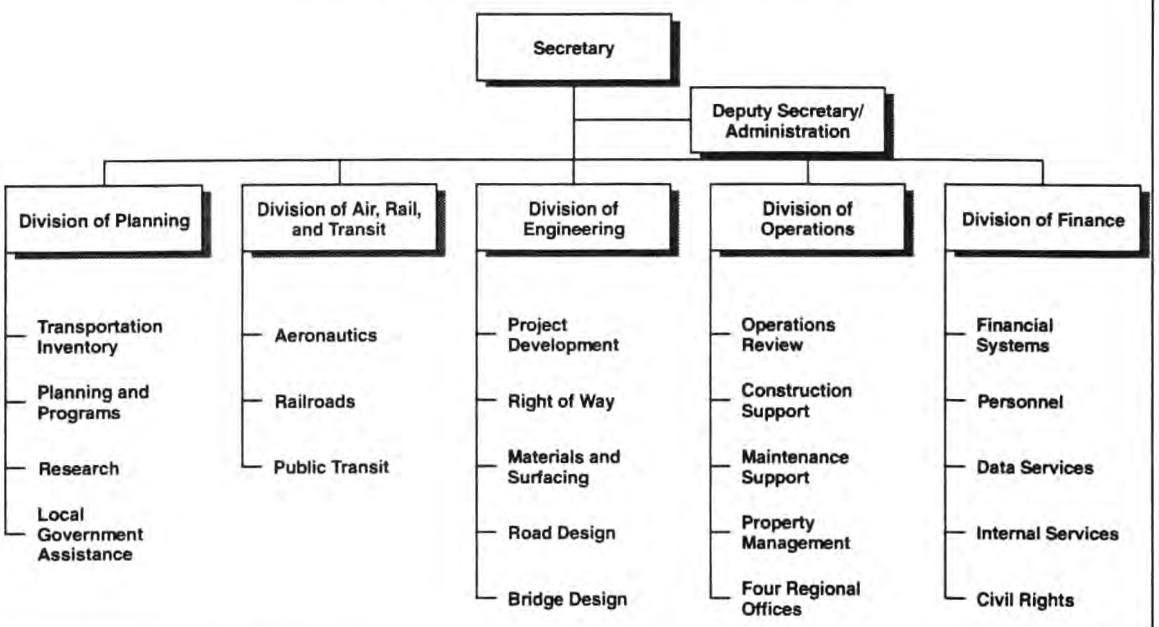
Organization, Staffing, and Inventories

The Department adopted a functional organization form some years ago (a project in which the Consultant assisted). Despite the organizational change, non-highway planning, programming, and design were never fully integrated with related highway activities. In 1993 the Department organized a new division—Air, Rail, and Transit—with the intent that this new structure would give added attention, direction, and emphasis to these operations. The organizational structure for highway-related work remained essentially unchanged.

Current Organizational Structure

The basic operating structure of the Department is shown below as Figure 3-13. As the chart shows, the Departmental operating structure now has five central office divisions.

Figure 3-13
Basic Organizational Structure
South Dakota Department of Transportation



ISTEA places emphasis upon high levels of coordination among all affected public and private entities, common use of inventories and data files (databases), coordinated data collection efforts, and institutional efficiencies for all intermodal operations. A strong case can be made for the functional organizational form in realizing the goals and objectives of ISTEA. However, organizational changes can be, and usually are, disruptive. We believe, especially given a relatively small organization, that the new structure the Department has adopted is workable. As with any organization, efforts must be constantly directed toward clearly defining authorities and responsibilities, establishing and maintaining high levels of coordination, and ensuring that operations, record systems, and field data collections are not unnecessarily duplicated. These issues are discussed in the next chapter.

Division of Air, Rail, and Transit

The new Division of Air, Rail, and Transit, as its name suggests, has three primary units.

Aeronautics

Aeronautics is not a new organizational unit. It previously existed in the Division of Planning. This unit has done most airport and air facilities-related planning and programming for some time. At the time our information was collected the unit had the same number of people and internal organizational relationships as it had when it was in the Division of Planning.

The State has 74 airports. Only one is State-owned (Custer State Park), and it is not operated by the Department. Nine of these airports (Aberdeen, Brookings, Huron, Mitchell, Pierre, Rapid City, Sioux Falls, Watertown, and Yankton) have regularly scheduled commercial passenger services (air carriers). The balance, grouped by airport classification, include:

- 7 that are classified as General Utility airports (all aircraft under 12,500 pounds);
- 17 classed as Business Utility II airports (95 percent of aircraft under 12,500 pounds);
- 19 classed as Business Utility I airports (75 percent of aircraft under 12,500 pounds);
- 4 classed as Landing Strips;
- 18 classed as Secondary airports; and
- 1 classed as a Private airport (available for use by the public).

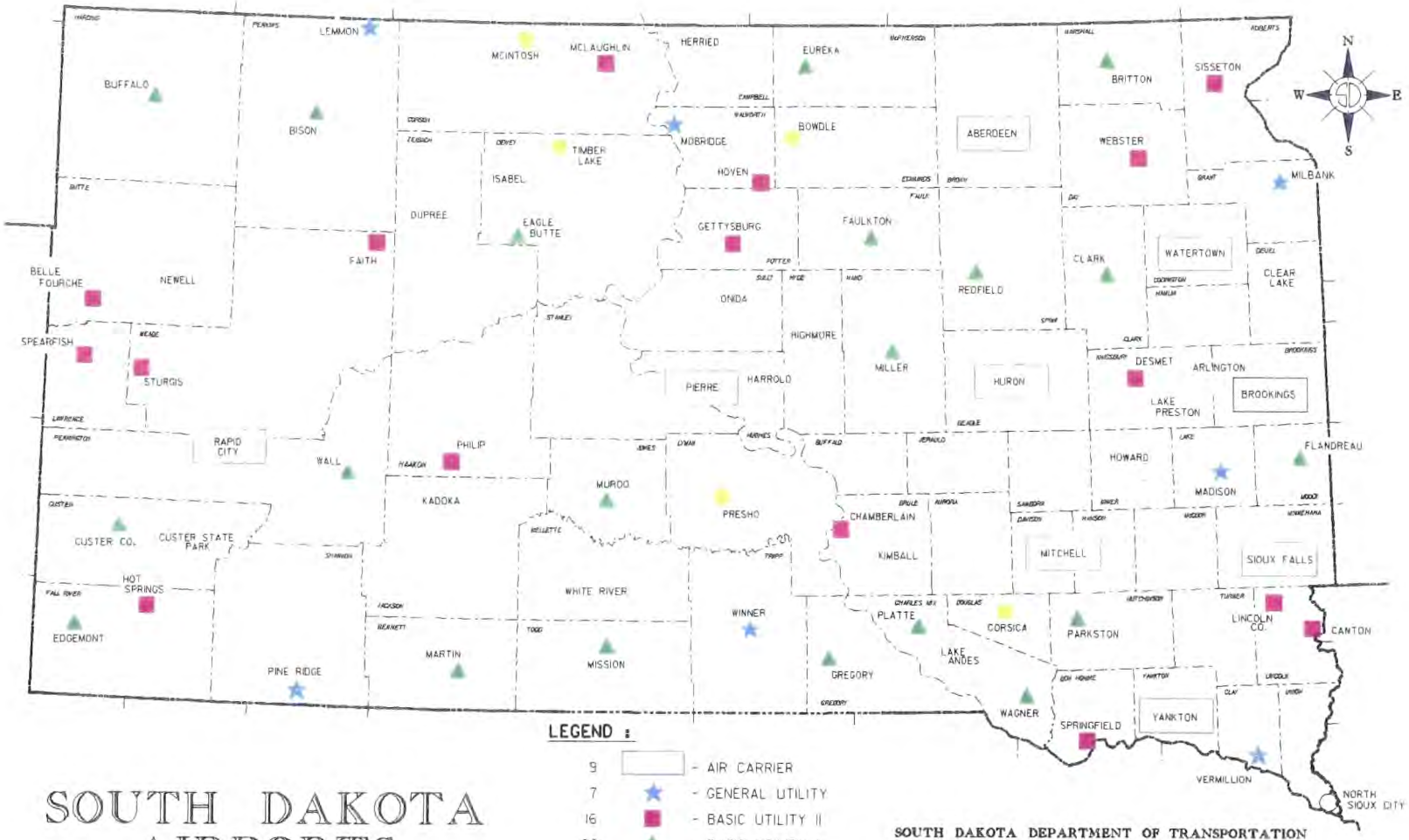
A listing of airport locations, by classification, is shown in Appendix A and their locations are shown on the map presented on the next page as Figure 3-14. The inventory was drawn from information currently maintained by the Aeronautics unit and the map is one provided by the Department from their current mapping system. The primary air-related intermodal facilities are the airports themselves, including both passenger and freight operating facilities, parking lots, and airport access roads.

Aeronautics' operations center on planning, programming, operational evaluations, and coordination with the owning and operating entities. Most aeronautics-related work is done within this unit. That includes planning, design, operational inspections, evaluations, and data collections. The exceptions are that the Division of Operations is responsible for construction engineering and inspections, and the Planning Division does runway pavement testing and provides the results to the Aeronautics unit.

In 1990 there was a change in federal guidelines for the development and updating of airport master/layout plans. They are now designed to be 20-year documents. New ones are prepared only if there is a reason to do so—significant changes in the airports or the communities they serve. Plan updating and development may be done by consultants, in-house personnel, or combinations of these staffs.

All federal transportation funding assistance to the airports (90/10, with 5 percent by the state and 5 percent by local match) flows through the Department, as does much of the coordination with U.S. and other state government agencies, other than the Federal Aviation Administration (FAA). Their lines of communication and coordination, at least those which do not involve funding, flow, in the main, directly to the operating and owning organizations.

Figure 3-14



SOUTH DAKOTA AIRPORTS

LEGEND :

9	□	- AIR CARRIER
7	★	- GENERAL UTILITY
16	■	- BASIC UTILITY II
20	▲	- BASIC UTILITY I
5	▬	- LANDING STRIP
16		- SECONDARY
1	○	- PRIVATE
74		

SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

PREPARED BY

DIVISION OF PLANNING

PIERRE, SOUTH DAKOTA 57501

AS OF 8/18/93

Aeronautics collects most of its own inventory and operational data or has it reported to them by operating authorities. The primary data processing applications, other than spreadsheets and word processors, are currently CADD files used for airport layouts. More extensive electronic applications have been considered but rejected because of the relatively high cost, relatively low data volumes, what is deemed to be marginal benefits, and current capabilities to produce needed information and summaries without additional data processing capabilities.

Primary data collections and information sources of the unit include:

- quarterly passenger boarding reports as prepared by the air carriers for the FAA;
- commercial landings and takeoffs from the FAA for the 9 commercial airports;
- freight and mail movement reports as prepared by five of the larger airports; and
- operational estimate reports prepared for the balance of the airports by their operators.

In addition to its planning, programming, and operational monitoring responsibilities, Aeronautics has responsibility for managing the Department's aircraft and providing its pilots.

A draft organizational chart for this new division, prepared in October 1993, showed a staffing plan of eleven people for the Office of Aeronautics. The draft plan had:

- two engineering supervisors, with one heading the unit;
- three engineers, (senior engineer, project engineer, engineer);
- a senior draftsman;
- a secretary;
- an aviation services manager;
- two pilots; and
- one mechanic.

Ten of the eleven positions were filled at the time the draft was prepared. One pilot's position was vacant.

Railroads

In 1992, at the time of the Department's preparation of its rail plan, there were about 1,940 miles of operational rail lines in South Dakota operated by nine railroads. Of the total track in South Dakota, the State owned about 588 miles within the State and 42 miles in Iowa.

Until the organization of Air, Rail, and Transit, the Division of Planning shared rail planning responsibilities with the Division of Railroads, which no longer has divisional status. Railroad-related responsibilities are now shared between the Division of Air, Rail, and Transit, and the Planning Division. There is no rail passenger service in South Dakota other than a couple of tourist, sightseeing trains, which are privately owned and operated.

The rail unit in Air, Rail, and Transit had only one position in the 1993 draft organizational plan. It was then filled by a property management specialist. The then scope of this unit was the lines owned by the State. Primary responsibilities included:

- lease management for facilities purchased with the railroads that were on railroad rights-of-way, service stations, etc.
- lease management for the railways themselves (all but 98 miles were then leased); and

- condition inspections for State-owned lines.

Condition inspections are made by consultants and railroad personnel, but the representative of this office accompanies them. There is a computerized lease management system; however, information on trips made and freight carried is compiled by the Planning Division. It is the view of key Division of Planning personnel that Planning will continue to do rail planning, and will continue to collect the information and make the operational evaluations which that implies, as is needed to fulfill all rail-related requirements.

In the past the Division of Planning shared responsibility with the Division of Railroads ". . . for conducting planning and analysis functions necessary to maintain an up-to-date State Rail plan. This includes the collection, analysis, and evaluation of data pertaining to rail lines and services in South Dakota."[3] The previously independent Division of Railroads was transferred to the Department of Transportation in 1991. Other authorities participating in rail planning include "the South Dakota State Railroad Board [which] provides public input and policy guidance for the planning process in matters relating to management of State-owned railroad property. The South Dakota Railroad Authority was created to provide a public financing mechanism for the acquisition and improvement of railroad facilities."[4]

The primary rail-related information, with intermodal significance, currently compiled and used by the Planning Division includes:

- system inventories and maps;
- freight origins and destinations within the state which are currently analyzed by line rather than station, although raw data on stations exist; and
- freight commodity shipments and their weights.

Public Transit

Public Transit, before the reorganization, was in the Division of Planning. Its Local Government Assistance unit then provided program management. The draft organizational chart for the new Division showed three positions in the Public Transit unit—two transportation specialists and an administrative assistant. All of these people were previously in Planning's Local Government Assistance unit.

In the past Planning's Local Government Assistance unit administered two federal programs designed to help support public and special transportation services. The type of operational information compiled and maintained includes:

- numbers and classifications (elderly, disabled, general public, etc.) of passengers;
- trip purpose (employment, nutrition, education, etc.);
- costs and revenues;
- vehicles purchased and their locations;
- vehicles not purchased with federal assistance but qualifying for federal operating funding assistance; and

[3] Ibid., p 3.

[4] Ibid., p 3.

- miles driven.

At the time of our data collections little information, other than routes and carriers, existed within the Department for inter-city bus systems owned and operated by the private sector. The location of routes, color coded by the three carriers serving South Dakota, are shown on the next page as Figure 3-15. Bus schedules are shown in "Russell's Guide," the development of which has been sponsored by the bus companies. However, Greyhound—which formerly helped sponsor—has withdrawn in favor of its own system, which may limit the usefulness of the Guide for future information.

Division of Planning

An organization chart prepared in October of 1993 for the Division of Planning shows four primary units—Transportation Data Inventory, Transportation Planning and Programs, Research, and Local Government Assistance. The basic structure, except for the transfer of Aeronautics, is as it was prior to the reorganization. The current basic operating structure of the Division is shown on the next page as Figure 3-16.

It is probable that the Planning Division and Data Services in the Division of Finance will be the most heavily impacted by the management system requirements of ISTEA. While we did not attempt to develop information or recommendations for responsibilities other than Intermodal, Planning appears to be the heir apparent for significant portions of bridge management, pavement management, congestion management, safety management, and traffic monitoring systems. In addition, it is likely that high degrees of coordination will be required with the Division of Operations for maintenance management. Even with the basic elements of these systems in place, as they appear to be, significant developments, improvements, and refinements are nearly certain over the coming five-year period.

Transportation Data Entry is the likely recipient of significant amounts of Planning's ISTEA management systems responsibilities.

Transportation Data Inventory

Transportation Data Inventory is currently divided into three units. Structures and Mapping are small units, each with two people (two engineers and two cartographers respectively). Road and Traffic Inventory is subdivided into five units:

- Automated Mapping is a one-person unit, staffed by a senior data analyst;
- Traffic Studies is also a one-person unit, staffed by a transportation analyst;
- Road Inventory has seven people that include an engineer, three technicians, and three transportation analysts;
- Traffic Data is headed by a transportation analyst and is supported by six electronic technicians; and
- Federal Programs has a transportation specialist and an analyst.

Figure 3-15

BUS LINE ROUTES

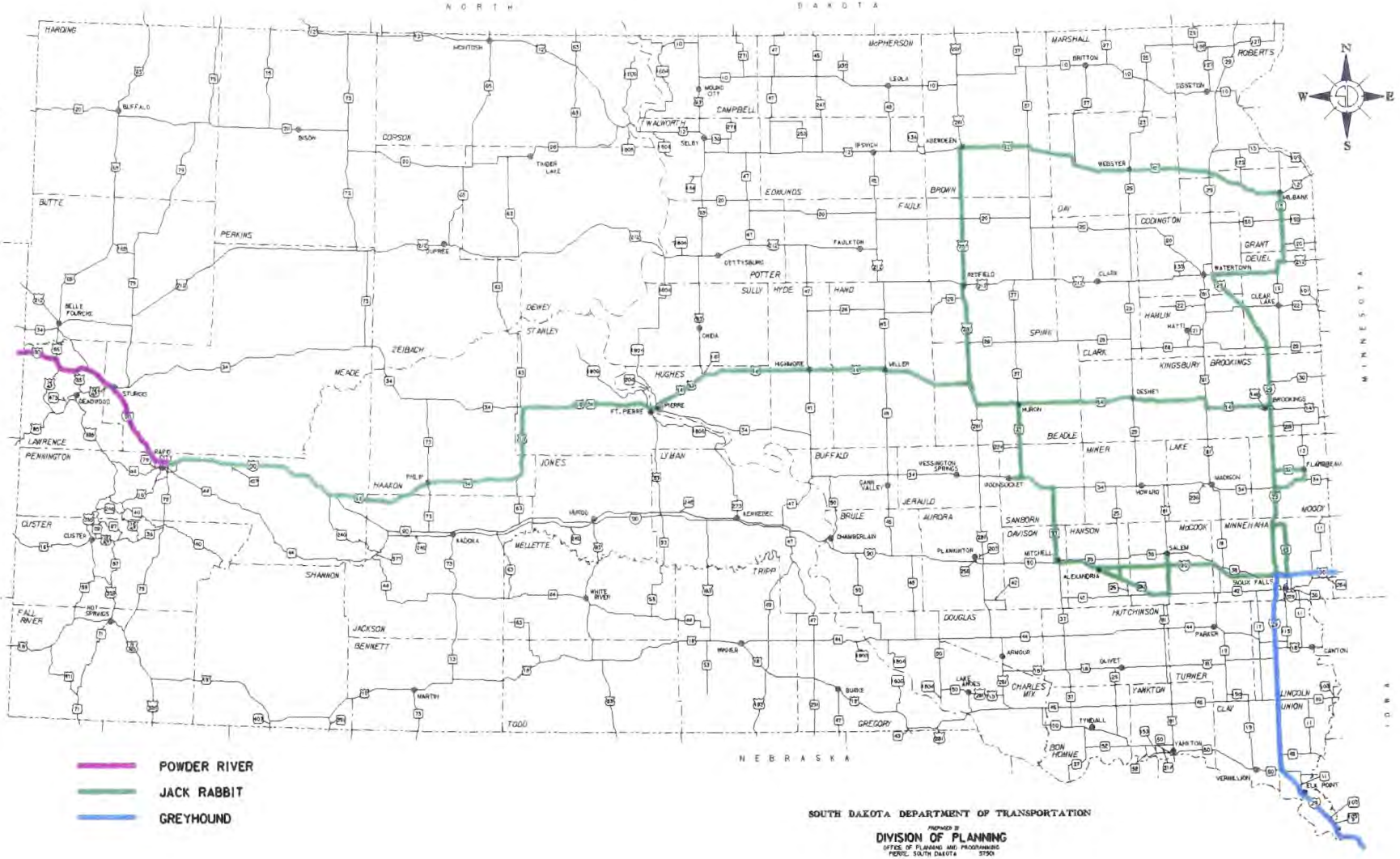
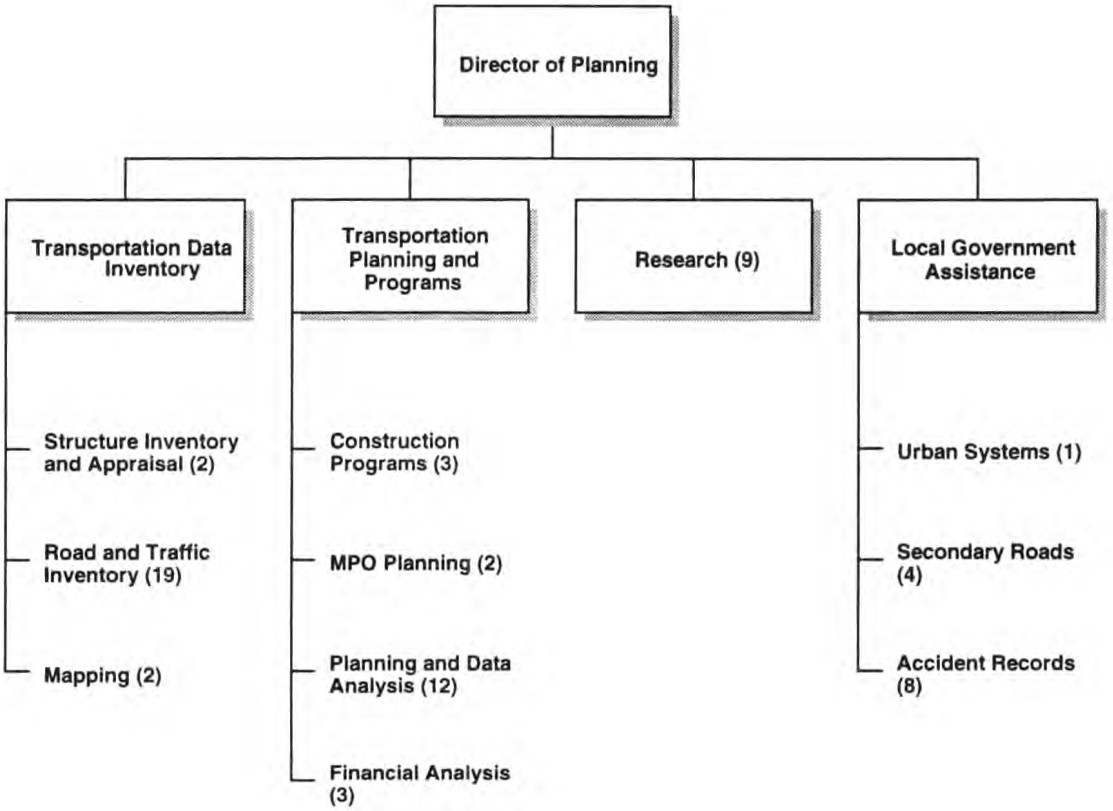


Figure 3-16
Division of Planning
Operating Organization



All of the information currently collected and analyzed by the Transportation Data Inventory unit are highway-oriented. Information of potential intermodal significance includes pavement conditions and histories for highways servicing intermodal facilities (airport access roads, and landing and runway pavements, freight loading access roads, etc.), traffic analyses done every other year, and trucking studies.

When our information was collected this unit had no data on air, rail, bicycle, or pipeline facilities; however, other units within the Division did.

Transportation Planning and Programs

Transportation Planning and Programs is headed by an engineer with the technical support of a programmer analyst. The balance of the structure is divided into four units, three of which are small:

- Construction Programs has three people, all of whom are engineers.
- MPO Planning has two engineers.
- Financial Analysis has a transportation specialist and two statisticians.

- Planning and Data Analysis has 12 people. The unit is headed by an engineer and assisted by a graphic designer. The balance of the unit is further divided into three groups—
  - * Planning has three transportation specialists;
  - * one Data Analysis unit has two engineers; and
  - * the second Data Analysis group has five people—two engineers, a transportation specialist, a data analyst and a data coordinator.

It is the Transportation Planning and Programs unit that has compiled most of the current information of primary intermodal significance. In mid-1993 they started the compilation of inventories and collection of data for the preparation of an initial "Statewide Intermodal Long-Range Plan." Basic elements of the draft report, available in the fall of 1993 included:

- maps for the State highway system, airports, transit system levels of service by county, bus line routes, rails, highway traffic flow, hospitals, educational institutions, trade centers, livestock auction points, and pipelines and terminals;
- many trend analyses, including agricultural production values, population projections, transport improvement funding estimates, revenues, etc.; and
- a conceptual outline for the Department's long-range planning process.

The development of this report was an important step for the Department. In its development the staff identified many sources of information and references that are of current and potential value in fulfilling the requirements of ISTEA. In addition, the report provided us with descriptions of current information sources within the Department, in other agencies, and in the private sector, as well as giving us a ready source of summarized information. Much of it, along with other Department reports, is reflected in this chapter, as well as the next.

Local Government Assistance

Local Government Assistance is headed by an engineer and divided into three units:

- Urban Systems has two engineers;
- Secondary Roads has four engineers; and
- Accident Records has an engineer, two statisticians, three statistical assistants, and an administrative assistant.

Research

Research has eight engineers.

Planning Staffing Summary

In total, the Division of Planning's October 1993 organization chart had 76 full-time positions, only two of which were vacant. The Division has only six secretarial positions, a ratio of nearly 12 people for each secretary.

Using information provided by the Department's Personnel unit, we reviewed Planning's staffing levels in mid-June for each of the last five years. The level of staffing—filled full-time positions—of the Division (excluding people transferred to the new Division of Air, Rail, and Transit) has ranged from 70 in 1990 to the current level of 74. Note that there may not have been a change in the number

of authorized positions during that period. Vacancy rates, among governmental units of five to ten percent, depending on market conditions, are common. And as previously shown unemployment rates in South Dakota are very low.

Planning uses a relatively large number of seasonal employees, as do most of the states. It can be a relatively inexpensive source of personnel for field data collections. The number of seasonal employees, also in mid-June of the past four years, was 17 or 18. There were 21 in 1989.

We were unable to identify ways to evaluate the effectiveness of current staffing utilization within the restraint of the project resources available. We had intended, at the outset, to prepare summaries of time charged by work activity, as drawn from the Department's financial system. We were advised that an activity structure is not used in reporting planning working hours as it is in construction and maintenance.

Intermodal Workloads and Usage

The objective of this section is to identify the intermodal facilities in South Dakota that are providing high levels of service. Doing so does not preclude the Department from developing improvement plans for lower-level facilities. But it does pinpoint facilities that are likely to have the greater economic impacts when priorities are drawn.

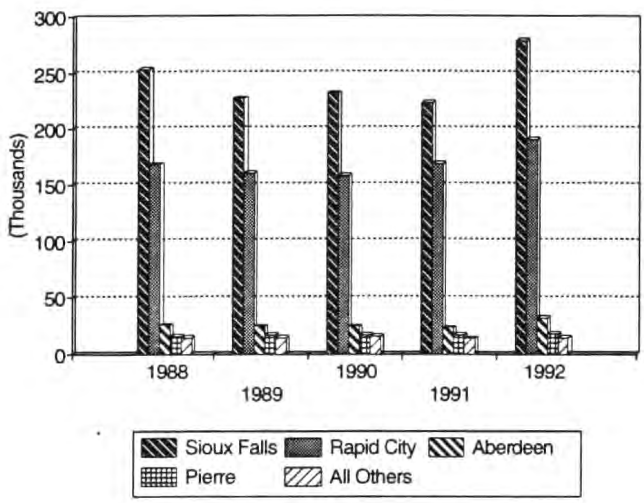
Airports

Of the 74 airports in the State, only nine have regularly scheduled passenger service. They are those of current intermodal significance for the movement of both people and freight. As noted in an earlier section, of the nine, two airports—Sioux Falls and Rapid City—have consistently, for the past five years, accounted for 88 percent of the State's total outbound passenger services. Aberdeen ranks third, with about 30,000 boardings per year, Pierre is fourth with 17,000, and Watertown is fifth with 8,000 per year. The remaining airports have fewer than 3,000 boardings per year.

There is concern about the decline in air passenger services in the areas outside of Sioux Falls and Rapid City, a decline that is generally attributed to deregulation and a subsequent deterioration of services. We reviewed boarding information for 1979, and each of the years from 1988 through 1992. The smaller airports were carrying about 20 percent of the traffic in 1979 (as opposed to 12 percent in 1992), but the patterns for 1988 through 1992 are very consistent. We did not identify information that would show the origin of passengers loading in Sioux Falls and Rapid City, but it is generally assumed that many people from the smaller communities travel to these cities to take advantage of lower rates and more frequent departures.

The total number of outbound passenger loadings for 1988 through 1991 was consistently about 450,000 people. 1992 showed a one-year increase of about 19 percent, much of which was in Sioux Falls, as shown in Figure 3-17.

Figure 3-17
Outbound Air Passengers
1988 through 1992



The average daily boardings (based on 360 days per year) for each of the airports with regularly scheduled passenger service were:

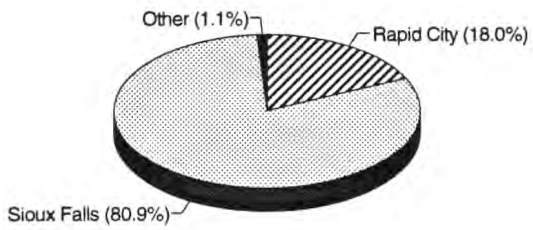
- 773 for Sioux Falls,
- 529 for Rapid City,
- 86 in Aberdeen,
- 48 in Pierre,
- 22 in Watertown,
- 7 in Yankton,
- 6 in Huron,
- 2 in Brookings, and
- 1.5 in Mitchell.

Deregulation has led to a reduction in air passenger subsidies, and some key people interviewed expressed concern that the subsidies could be completely eliminated. It would appear that such an action certainly would endanger commercial passenger service at many of these airports.

Information on air freight movements, as well as air passenger boardings, was provided by the Department for five airports (Aberdeen, Pierre, Rapid City, Sioux Falls, and Watertown) from their normal data collection efforts. These data show:

- total in and out air freight shipments in 1992 were nearly 5,100 tons, of which 56 percent was inbound;
- about 80 percent of the total air freight traffic, as shown in Figure 3-18, was at the Sioux Falls airport, and most of the remainder was at Rapid City;
- significant growth, 37 percent, in outbound freight in the five years reviewed—1,634 tons in 1988, 2,007 tons in 1989, 2,210 tons in 1990, 2,127 tons in 1991, and 2,243 tons in 1992;

Figure 3-18
Distribution of Total Air Freight Shipments
1992



- slight decline in inbound freight traffic in the past three years—3,229 tons in 1990, 2,931 tons in 1991, and 2,840 tons in 1992; and
- two airports—Aberdeen and Watertown—had significantly higher outbound freight than inbound, while all the others had larger amounts of inbound traffic.

Airmail is a significant workload for the five airports that reported freight and mail movements. Sioux Falls, as might be expected, had nearly 84 percent of the reported airmail movements in 1992, and nearly 96 percent of all the inbound airmail. The data for Rapid City looks so strange as to be suspect. It had only 4 percent of the incoming mail in 1992, but nearly 27 percent of the outgoing. The data show a rapid growth in outgoing mail for Rapid City from about 184 tons in 1988 to nearly 660 tons in 1992, a five-year increase on the order of 260 percent.

The other three airports had, in 1992, only one percent of the incoming air mail and almost two percent of the outgoing.

The Rail System

As noted earlier, the State has nearly 2,000 miles of operational track, of which about 30 percent is owned by the State. There is no passenger service, so the intermodal rail concerns are limited to the movement of freight. Rail shipments, in terms of tons originating and terminating in South Dakota, were about 12 million tons in 1991. That was essentially a doubling of freight volume over the preceding ten-year period. Farm products, and stone and clay, amounted to more than 96 percent of the total tonnage originating in the State (79 and 17 percent respectively). And about 87 percent of the tonnage terminating within the state were coal (64 percent), and stone and clay (23 percent).[5]

The major rail carriers, in terms of total tonnage shipped in 1991 were:

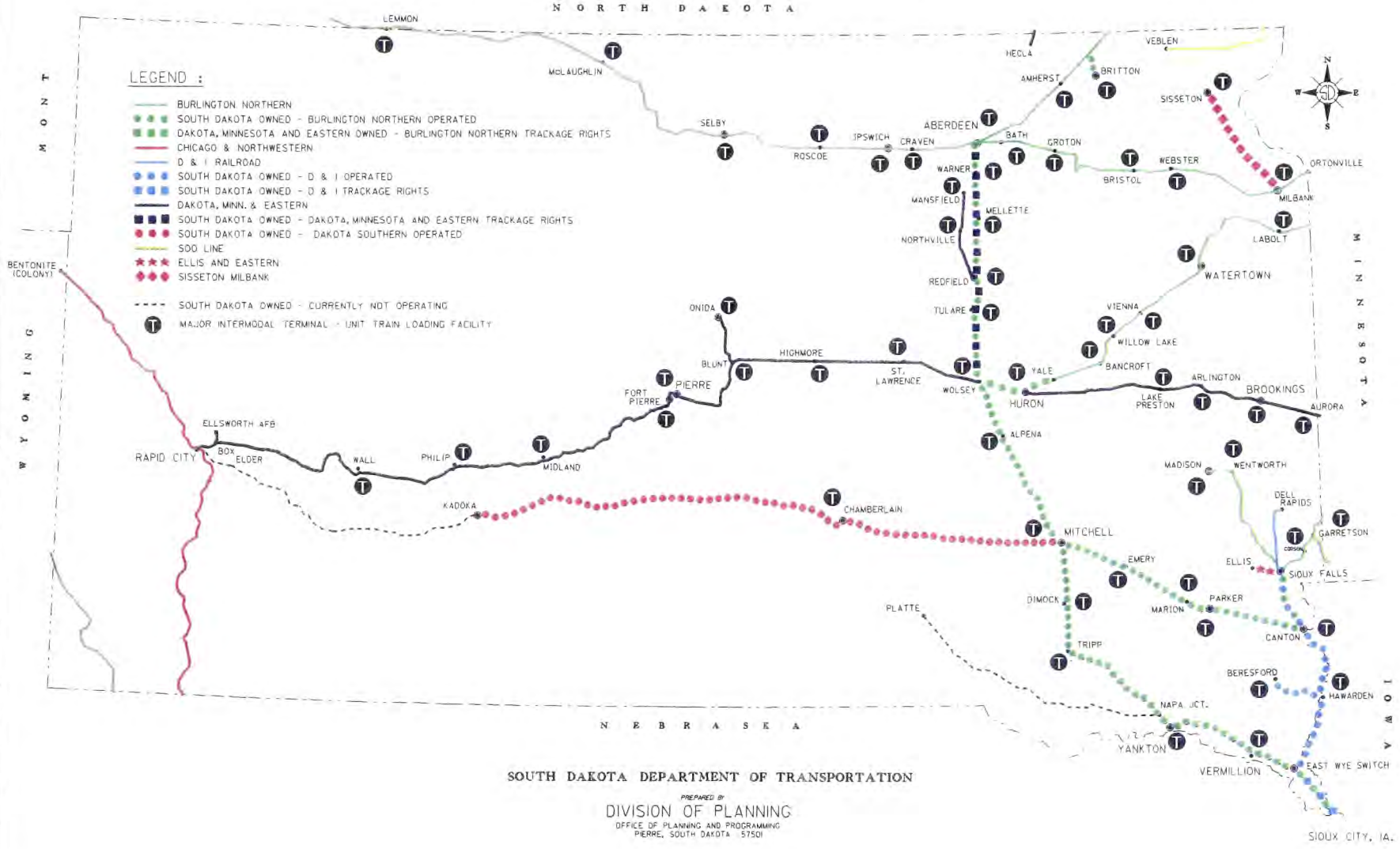
- the Burlington Northern ,with nearly 62 percent of the total tonnage shipped;
- the D&I, with about 15 percent;
- the DM&E, with about 11 percent;
- the C&NW, with nearly 5 percent; and
- the other four lines, with about 7 percent in total.

Three lines are handling about 88 percent of the freight shipped as measured in tonnage hauled. The map on the next page, Figure 3-19, shows the state's rail network. The map is color coded by owning and operating entities. It also shows unit train loading facilities which are discussed next. This map was prepared by the Department from currently maintained record systems.

[5] South Dakota Rail Plan, 1992, pp. 32, 33.

Figure 3-19

SOUTH DAKOTA RAIL MAP



SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

PREPARED BY

DIVISION OF PLANNING

OFFICE OF PLANNING AND PROGRAMMING
PIERRE, SOUTH DAKOTA 57501

Unit Train Elevators

Some fifty-nine grain elevators with unit train capability currently service the agricultural needs of the State. At least one location utilizes direct truck-to-train loading techniques.

A listing of the locations of the unit train facilities is shown in Appendix A. Most of these facilities (54) are located in the eastern half of the state (from Ft. Pierre eastward). Their locations in relation to rail facilities were shown in the previous figure. There locations, as well as the locations of other elevators (those without unit train loading facilities) in relation to the state's preferential truck network are shown on the next page as Figure 3-20 (again a map currently prepared by the Department).

Information as to the capacity, commodities handled, and commodity volumes is not currently available. There is no requirement for these privately owned facilities to report the data, as there is in some other states (North Dakota, for example).

Trucks

Undoubtedly the primary intermodal carrier in South Dakota is the trucking industry. As earlier noted, total truck registrations in South Dakota grew from about 230,000 in 1981 to almost 268,000 in 1991, a ten-year increase of about 16 percent. There is little information within the Department about truck origins, destinations, or cargoes carried. However, the national and regional sources of trucking information and the types of information available are explored in some depth in the previous chapter.

The South Dakota State Highway Patrol has two basic trucking information sources. The first is a result of their permitting function. It is transaction-oriented, and it is not computerized. The permit gives the origin and destination of the vehicle, but that may not be the same as the origin and destination of the load. The second source is their inspection records. This record gives the load and its origin and destination. Some of the inspection information is computerized, but the loading information is not currently a part of their electronic record.

Another potential local source of truck, bus, etc., information is the Public Utilities Commission. The difficulty here is that the vehicle classification structure does not differentiate among vehicles in a manner compatible with an analysis structure such as the Department needs. Trucks, commercial buses, and school buses, for example, may all be in the same classification.

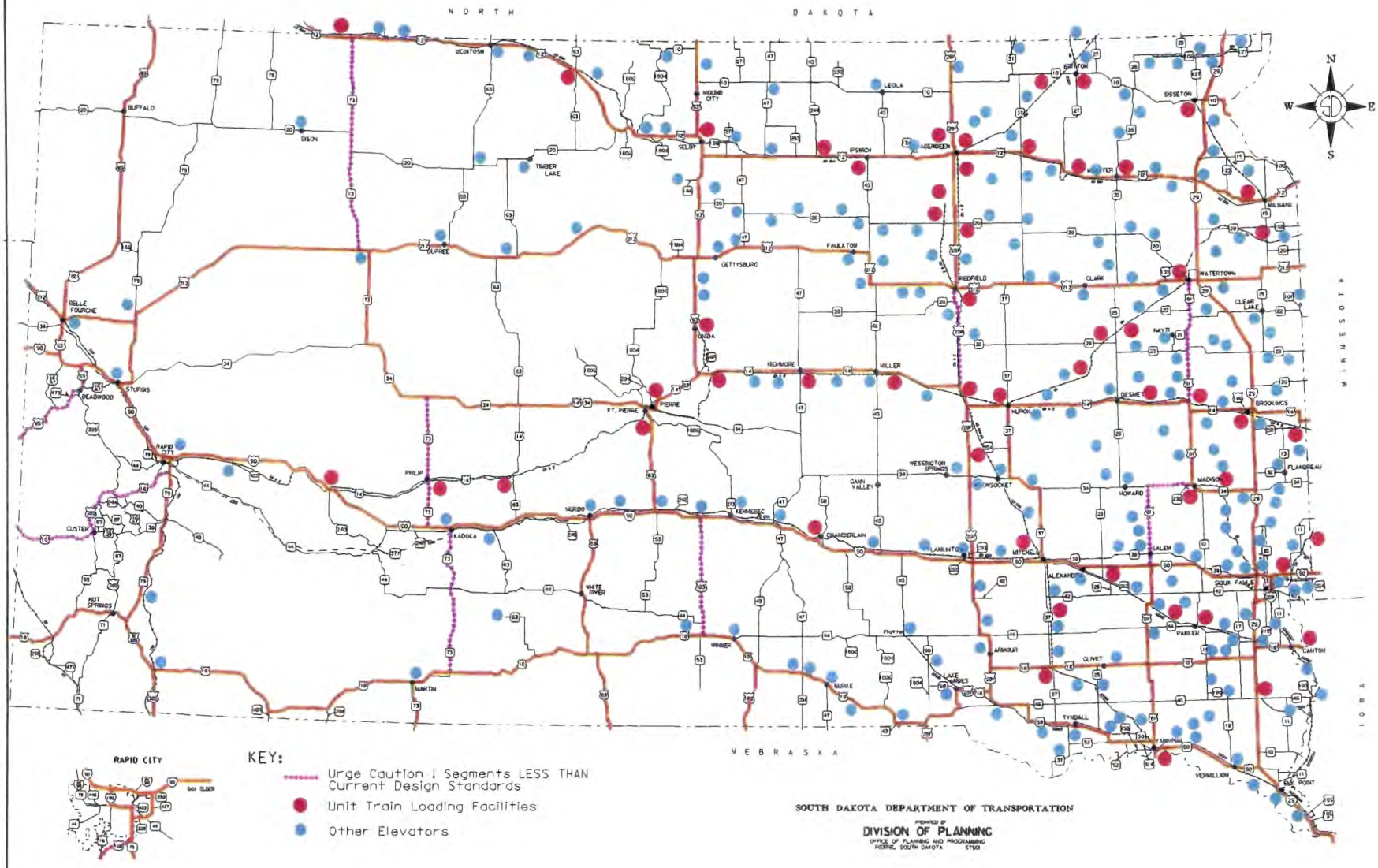
There are at least two basic perspectives about the adequacy of current levels of trucking information. One is that too little is known about where trucks originate, where they are bound, or the types of cargo they carry. This view would logically lead to attempts to compile and analyze massive amounts of additional trucking information.

The second logical perspective is that the primary trucking impacts are modal and not intermodal. While there are certainly impacts upon both, the highway impact is being addressed through traffic volume and weight studies that are not burdened by irrelevant (from a pavement management point of view) information concerning the types of cargoes carried. This is a point that is more completely developed in the next chapter.

Figure 3-20

STATE PREFERENTIAL TRUCK NETWORK

with UNIT TRAIN GRAIN LOADING FACILITIES and ELEVATORS



Other Facilities

Other facilities with intermodal implications include pipelines, bike paths and walkways, park-and-ride lots, truck terminals, and waterways.

Pipelines

The Department's draft Intermodal Long-Range Transportation plan identifies four pipelines for the delivery of petroleum products:

- Wyco, with a terminal in Rapid City;
- Kaneb, with terminals in Yankton, Mitchell, Wolsey, and Aberdeen;
- Williams, with terminals in Sioux Falls and Watertown; and
- Amoco, with a terminal in Sioux Falls.

A map showing these locations and the pipelines, as presented in the Department's report is shown as Figure 3-21, on the page next following.

Volumes and commodities carried are not known. It is thought that the first three are common carriers and that their volume and commodity information should be available. However, the Amoco facility is privately owned and operated. It is unlikely, because of competitive pressures, that this information is currently available.

It is also thought that all petroleum terminals currently are served by truck, and that if rail facilities exist, they are not used.

Bike Paths and Walkways

Bike paths and walkway projects are normally undertaken by local government. No comprehensive inventory of existing facilities was found. However, the draft Intermodal Plan describes the State's policy, federal funding assistance sources, local government application considerations, and a typical project being undertaken in the Black Hills.

Truck Terminals

No inventory of truck terminals was identified. It is assumed that they are all privately owned, with locations distributed throughout the State.

Waterways

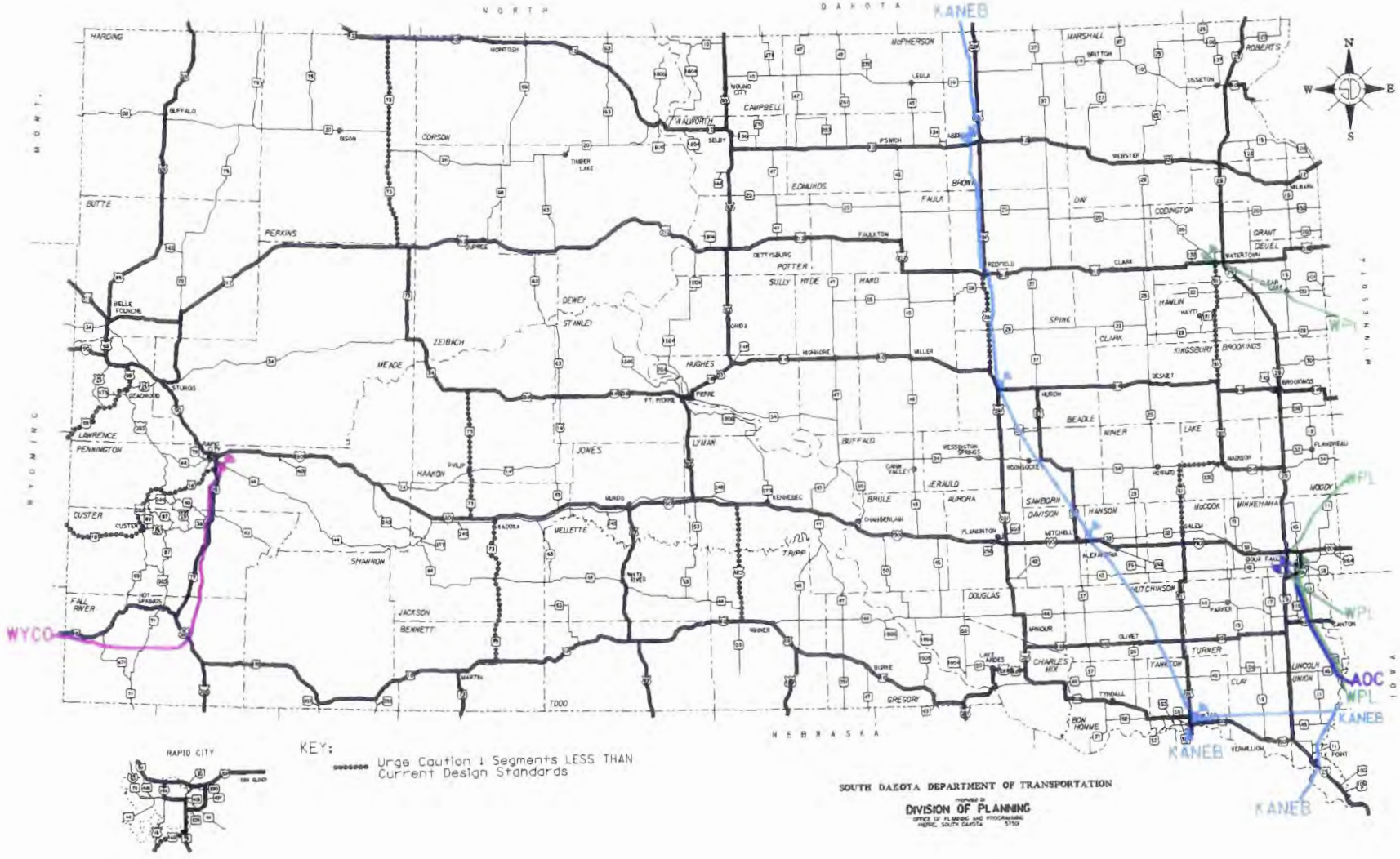
To state the obvious, South Dakota lacks direct access to seaborne transportation. Further, the State has no commercially navigable inland waterways. Access to the inland waterway system is provided through Sioux City, Iowa but, because of its characteristics (wandering channel), the waterway is limited in the type and size of tows available (four shallow draft barges).

No volume or commodity information was found within the Department or other organizations contacted; however, as discussed in the next chapter, the Corps of Engineers compiles and maintains extensive data on waterway freight movements.

Figure 3-21

PIPELINES and TERMINALS

IN RELATION TO THE SOUTH DAKOTA PREFERENTIAL TRUCK NETWORK



Survey Results

More than one hundred face-to-face and telephone interviews were conducted with representatives of government at the State and local levels, representatives of trade associations, and private-sector business people. The objective was to identify intermodal issues of concern to those contacted.

We initially expected to complete most of the interviews in Pierre, Rapid City, and Sioux Falls, locations where we expected to find the more significant intermodal issues. Upon the urging of the Panel convened to guide the project, the interviews were expanded to include a wide sampling of the State.

The most frequently heard comments were compliments for the South Dakota Department of Transportation and the highway system they have constructed and maintain. Comments of this type were heard from trade associations, MPO's, other agencies of government, and private industry—virtually every type of contact we made.

Most of the issues we identified were modal in nature. Only a few had intermodal implications. The following is a summary of the more significant comments made.

Rail

The most significant issues identified were rail related, and came from the western portion of the state. Some of the rail system operates within a 10 mph speed limit. The Dakota Cement Co. in Rapid City noted that slow rail transportation inhibited their ability to be competitive and to capitalize on the markets they would be able to serve with higher operating speeds and quicker car turnaround. One of their primary rail-serviced markets is Sioux Falls. They noted a ten-day car turnaround to this market that involves four different railroads. Similar problems to southern and northern markets were described. Inabilities to establish effective working relationships with the railroads was also identified as a significant problem.

One of the unit train operators estimated that 20 to 25 percent of the state's grain handling facilities had been financially reorganized or merged over the past 18 to 20 months, and that poor rail service was a factor in most of these cases. The primary problem cited was poor rail scheduling. The operator noted that they must pay penalties if the train is not loaded promptly, but that the railroads face no penalties for late arrival. More prevalent views of the elevator operators were concerns about the seasonal shortage of cars, the shortage of locomotives as being more significant than the shortage of cars, track conditions, limited rail facilities, and the time spent cleaning cars to meet regulatory requirements.

Two markedly different views as to the future of unit train facilities were expressed. One is that too many of these facilities have been established in attempts to gain greater market shares. The number in operation more than doubled (from 29 to 59) in the six-year period from 1986 through 1992. During the same period in adjacent states the trend was to fewer and larger facilities. The second, and more optimistic view is that improved rail facilities, which are confirmed by Department analyses, are enabling shippers to use rail for longer and more economical hauls, at the expense of truckers.

Comments were received about the absence of passenger rail service, but most seemed to accept the lack of service as an economic reality.

Air Services

Air-related comments ranged from a need for direct Interstate access to the airport in Rapid City and a lack of jet service there, to concerns for the future of the smaller airports with deregulation and

reduced subsidies. A general concern was expressed as to the adequacy of public transport to airports in general, but this was not a concern identified at the local level.

Highways

Many comments received related to highways and trucking. They included:

- four-lane Interstate access for Pierre and other locations;
- a southeast by-pass for Rapid City;
- improved access from Vermilion and Yankton to Nebraska;
- needs to breakdown loads because Interstate overpasses are too low;
- a need for longer combinations of commercial vehicles and for a standardization of size and weight restrictions with adjacent states;
- needs to lower trucking rates; and
- a lack of intercity busing and the difficulty in acquiring basic busing information.

It was noted that there are truck waits at pipeline terminals, however, the waits are for the desired product to be in the pipeline rather than facility or access shortfalls.

Chapter Four

Conclusions and Recommendations

Conclusions and recommendations for the Department's Assessment of Intermodal Transportation Information Needs project are presented in four sections in this chapter—IMS importance to South Dakota, management system design, evaluation models, organization, and staffing.

IMS Importance

There is a great deal of concern about the importance of an intermodal management system to the Department and the economy of South Dakota. Its primary importance, in our view, is that the design, implementation, and maintenance of an IMS is a federal requirement. While there is latitude in the Interim Final Rule as to the characteristics of the systems states adopt, the system is required. In the General Discussion portion of the Interim Final Rule it was noted: "Many of the State agencies objected strongly to being held responsible for implementing the management systems for facilities not under their jurisdiction. They also objected strongly to withholding of funds for noncompliance by other agencies (such as local governments) that have jurisdictional responsibility for the facilities." The response, in part, was: "The legislation also specifically requires that states develop, establish, and implement the management systems and that funds apportioned to the States may be withheld for noncompliance."[1]

So it is the law, what implications are there beyond that? Clearly compliance has and will continue to require the expenditure of scarce resources for the six mandated management systems, including the IMS. We know of no way to quantify the benefits that may accrue from these systems other than to note the potential loss of revenue that could be imposed for noncompliance.

From a national perspective there are no major rail or water intermodal facilities within the state, the nearest for the state's eastern agricultural producers are in Fargo, Dilworth, Minneapolis/St. Paul, and Sioux City.[2] All except Sioux City are served by the Burlington Northern, which is the primary carrier in South Dakota. In 1990 the Burlington Northern had about 60 percent of the state's total rail freight in terms of both tonnage and carloads.

Importance, of course, must be viewed within South Dakota's economic perspective. Clearly many of the non-highway facilities, identified in the previous chapter, are of significant importance to the state's economy. Other than the airports (in which the Department has federal and state funding vested interests) and state-owned track, the facilities involved are owned and managed by the private sector or other entities of government. In recognition of that fact the Interim Final Rule, for the IMS, encourages "...States and local agencies to build on the relationship between public and private sector transportation providers."[3] It is through cooperative and proactive relationships with these organizations that the benefits of the IMS will be realized. And the line between assistance and

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[1] Federal Register, Volume 58, Number 229, Wednesday, December 1, 1993, Rules and Regulation 63445.

[2] The Official Intermodal Guide, Region 10, H 108.

[3] Federal Register, 63467

interference may be a fine one. We are not now able to determine if the IMS will be an economically-wise endeavor for the Department. But implementation of the recommendations presented in this chapter will, in our opinion, bring the Department into compliance with the basic data collection and analysis requirements of the Interim Rule making and ISTEA.

Management System Design

Minimum elements of the Intermodal Management System (IMS), as defined by ISTEA and subsequent rule making, are described in two categories—basic characteristics of management systems to be implemented, and those that are required for the IMS.

Basic Characteristics of Systems

A management system is defined as a systematic process designed to assist decision makers in selecting cost-effective strategies and actions needed to improve the efficiency and safety of the nation's transportation system while preserving and protecting the investment it represents. Minimum characteristics of an effective management system are:

- identification of performance measures;
- data collection and analyses;
- determination of needs;
- evaluation and selection of appropriate strategies and actions to address the needs;
- evaluation of the effectiveness of implemented strategies and actions;
- an oversight process to assure that adequate resources are available for implementation and that target dates in work plans are met;
- use of data bases with common or coordinated reference systems and methods for data sharing; and
- a mechanism to address issues that cross the boundaries of more than one management system.

Intermodal System Requirements

Interim Final Rule Making for ISTEA established general requirements for the intermodal management system (IMS) to be implemented by the states, as well as its basic components, and compliance schedules.

General Requirements

Each state shall develop, establish, and implement, on a continuing basis, an IMS that provides efficient, safe, and convenient movement of people and goods through integration of transportation facilities and systems and that improves the coordination in planning, and implementation of air, water, and the various land-based transportation facilities and systems.

The IMS shall address intermodal transportation needs by a process that considers the following issues:

- *Connections.* The convenient, rapid, efficient, and safe transfers of people and goods among modes that characterize comprehensive and economic transportation service.
- *Choices.* Opportunities afforded by modal systems that allow transportation users to select their preferred means of conveyance.
- *Coordination and cooperation.* Collaborative efforts of planners, users, and transportation providers to resolve travel demands by investing in dependable, high-quality transportation service either by a single mode or by two or more modes in combination.

The IMS shall consider the movement of both people and goods, alternatives for meeting transportation demands involving combinations of modes, and provide timely and appropriate information for intermodal transportation decisions for site-specific intermodal facilities, as well as the systems necessary to achieve the most efficient transportation movement.

Because of their interrelationship, the development, establishment, and implementation of the IMS shall be coordinated with the development, establishment, and implementation of the congestion management system and the public transportation management system....

In metropolitan planning areas that have more than one MPO and/or include more than one state, the development, establishment, and implementation of the IMS shall be coordinated to ensure consistency in the development of intermodal facilities, systems, plans, and programs.

IMS Components

Identification of intermodal facilities. The IMS shall identify intermodal facilities and intermodal transportation systems and establish the demands placed upon them to accommodate intrastate, interstate, and/or international movements of people and goods.

Identification of performance measures. Parameters shall be identified that are suitable to measure and evaluate the efficiency of intermodal facilities and systems in moving people and goods from origin to destination. Parameters may include the total travel time, cost, and volumes for moving cargo and passengers, origins and destinations, capacity, accidents, ease of access, perceived quality, and the average time to transfer people or freight from one mode to another. Since the expectations and measurements of transportation quality of service vary between communities and industries, performance measures shall be established cooperatively at the State and local levels with private sector coordination, as appropriate.

Data collection and system monitoring. The IMS shall include a continuing data collection and system monitoring program that is coordinated with data collection and system monitoring programs for the congestion management, public transportation management, and traffic monitoring systems. It shall include a base year inventory consisting of physical and operational characteristics of intermodal facilities and system, and surveys of the operational and physical characteristics of intermodal facilities and systems based on performance measures established by State and local transportation agencies. Operational characteristics may include time, cost, capacity, and usage. This information should be obtained, to the extent possible, from the ongoing metropolitan and statewide planning processes. States shall coordinate their data collection programs with programs of U.S. DOT.

System and facility efficiency evaluation. Data collection and system monitoring shall be used by the States and local agencies to evaluate the performance of intermodal facilities and systems to determine the efficiency of the movement of people and goods.

Strategy and action identification and evaluation. Statewide and local strategies and actions that improve the intermodal efficiency for the movement of people and goods shall be developed and evaluated. Methods for increasing productivity and the used of advanced technologies (such as high speed rail) and innovative marketing techniques (such as just-in-time delivery) shall be evaluated where appropriate. The evaluation program shall determine what project or combination of projects and actions would most effectively improve the intermodal productivity of transportation systems, in terms of the established performance measures, for both the short and long term.

IMS compliance schedule

- By October 1, 1994, the State shall develop a work plan that identifies major activities and responsibilities and includes a schedule that demonstrates full operation and use of the IMS by October 1, 1996. Intermodal facilities shall be inventoried and data collection activities shall be initiated.
- By October 1, 1995, performance measures and standards shall be established, system design shall be completed or underway in accordance with the State's work plan, and full-scale data collection shall be underway.
- By October 1, 1996, the IMS shall be fully operational and shall provide projects and programs for consideration in developing metropolitan and statewide transportation plans and improvement programs.[4]

Traditional Conceptual Guidelines

Normal planning conceptual guidelines for complex infrastructure and embryonic databases, such as those currently available for the IMS, require five basic elements:

1. **Inventory of facilities, equipment, and rolling stock**. This inventory must include all items large enough to be replaced with capital funding, and it must have sufficient detail to allow distinction in capital and maintenance costs from one facility to another. It is important to divide the inventory into "elements" where each element is a distinct type of facility or equipment having its own cost structure, deterioration rate, and feasible actions.
2. **Condition survey**. It is necessary to have a general idea of the condition of each element in the system. In some cases, age can act as an expedient proxy for condition, but the information is much more valuable to management if a routine, scheduled inspection process is in place.
3. **Deterioration models**. With a condition survey in place, it becomes possible to build and maintain deterioration models. Combined with cost factors, such models allow the quantitative analysis of the relationship between capital and maintenance expenditures. This is the only realistic way of systematically quantifying the preservation benefits of capital and rehabilitation projects, and it also permits quantitative distinction among alternative maintenance policies. "Markovian" models have become an established methodology for network-level deterioration, because they require less data than any other method. They express deterioration rates as the fraction of an inventory of facility elements which change from one condition level to another over a standard time period (usually one to five years).
4. **Action and cost models**. Cost factors are necessary in an IMS both to quantify immediate budgetary requirements, and to quantify the future savings resulting from preventive maintenance and capital investment. The IMS will include feasibility rules for identifying appropriate actions for all facility elements and system components, a cost file containing standard unit costs for the actions, and a database for tracking costs as they are actually incurred, to permit future updating and refinement of the standard cost factors. For specific project needs, users will be able to override the standard costs if a more formal cost estimate is available.
5. **Performance impacts**. The basic building blocks listed above provide a consistent set of costs and benefits for the entire range of potential capital projects and maintenance policies. This system-wide consistency is critical, because it allows the use of straightforward methods for setting project priorities, and analyzing the budget impacts of alternative policies. The latter type of analysis is one of the greatest benefits of an IMS, because it provides management with extremely quick and responsive feedback on system-wide decision issues, including a "what-

[4] Federal Register, Part II, Department of Transportation, December 1, 1993, Rules and Regulations, 63483.

if" capability which directly addresses the kinds of questions most often asked of top management.

The Need for Non-traditional Guidelines

ISTEA mandates the implementation of these traditional conceptual guidelines for publicly-owned transportation facilities. However, many of the intermodal facilities in South Dakota are privately owned. Even so, facility locations are not difficult to identify. The Department has already done so for most of the more important ones. And the general outputs and inputs to these facilities are, in many cases, already known. However, the compilation of the information needed for the balance of the traditional conceptual planning guidelines—condition; construction, maintenance, and replacement costs; productive capacities and the like—are simply not feasible or desirable for privately held facilities. Costs of global data collections and analyses would be high, and the line between assistance and interference could be difficult to maintain. And where such information is compiled, care must be taken, as the Bureau of Census has done, to guard against its disclosure when its use could result in competitive advantage or disadvantage.

ISTEA recognized the problem and emphasizes a need to establish highly cooperative working relationships among transportation users and providers in both the private and public sectors. Cooperative relationships that can compensate for the absence of the information transportation planners have traditionally used for publicly-owned facilities.

There has been some controversy as to the primary focus of the IMS. One view, a narrow one, focuses only on intermodal facilities themselves. The other view, the one we believe the Department should adopt, focuses on the total intermodal trip insofar as that trip impacts the economy and transportation systems of South Dakota.

The final part of the IMS conceptual guideline relates to what information should be collected, compiled and analyzed. Clearly the monitoring, by commodity, for all origins and destinations in South Dakota is not practical or necessary. Rather the movement of people and freight, separately identified, should be monitored in general ways to identify trends, opportunities, and bottlenecks. Sector and subsector analyses such as those presented in chapter three from census data can serve to provide an economic "pulse-rate" for the economy. These data, discussions with key industry representatives, general movement monitoring, and the Department's own extensive knowledge of transportation systems within the State should be used to direct more detailed data collections that are industry oriented.

General Current Status

Many elements of the needed intermodal system are already in place. The Department needs to build upon its current developments and strengths, and, in some cases, supplement them. The development of ISTEA management systems, and particularly the IMS, is conceived to be evolutionary in nature. However, time lines for getting started are clearly drawn and will require Department action. In general the current status of IMS-related developments, discussed more specifically by mode in the sections that follow, are:

- performance measures as they are described in ISTEA are not generally in place;
- data collections and analyses are generally being done but need to be supplemented;
- determinations of need and evaluations of effectiveness are being made, but more in a modal than an intermodal sense;
- the basic organizational structure needed to provide an oversight process is in place;

- databases with common or coordinated reference systems are in place, but generally on a modal basis, as is currently the case with most transportation agencies; and
- SDDOT, judging from the results of our survey, has done a good job of coordination with its clients, but implementation of ISTEA concepts will require even further strengthening of lines of communication and interaction with intermodal system users.

Recommended Basic System Structure

RECOMMENDATION ONE. The recommended basic structure for the Department's Intermodal Management System is:

1. Establish separate systems for freight and people movements.

2. Establish general performance standards by mode for those involving intermodal movements. Involve transportation users and providers in both the private and public sectors in establishing the standards. Avoid commodity based standards. Use ones that will provide "transportation pulse rates" that will help to identify improvement opportunities and bottlenecks. Avoid, insofar as possible, new data collections for monitoring at this level.

3. Monitor general economic activities at the state, sector level, and subsector level for those sectors showing growth or improvement opportunities.

4. Undertake detailed studies when improvement opportunities and bottlenecks are identified. At this level invoke traditional conceptual planning guidelines—detailed inventories as they are needed, condition surveys and deterioration models, action and cost models, and performance impacts.

5. Continue and strengthen lines of communication with transportation providers and users. Actively seek definitions of improvement opportunities from their perspectives

Applications of these general recommendations are discussed by mode in the sections that follow.

Air Movements and Facilities

Aviation facility inventories in South Dakota are in place for all facilities publicly owned or privately owned and open for public use. A Department map showing locations of all airports, by classification, was presented in chapter three. Detailed facility inventories, expressed as master layout plans, are currently prepared and maintained. The inventories are currently in compliance with federal requirements.

Passenger boarding and disembarking, for the nine airports with regularly scheduled commercial air services, are routinely reported. Aircraft operations at the other airports are routinely estimated and reported to the Department. Some passenger movement trend analyses are currently done.

One of the first intermodal issues identified was the decline in passenger movements at the seven smaller airports. It is generally assumed that people travel from the smaller cities to Sioux Falls and Rapid City to take advantage of better and lower-cost services. Air passenger initial origin information for people traveling to these airports is not known, and there is no current information source.

Comparative fare costs for flights originating at all nine airports are readily available (one ready and inexpensive source is CompuServe's OAG Electronic Edition Travel Service) but not routinely

analyzed. A comparison of fare costs among Sioux Falls, Yankton, and Sioux City showed little difference in the total range of fares quoted (the inquiry took only a few minutes through CompuServe). However, Yankton serves only two hubs (nonstop to Minneapolis and one stop to Denver) while Sioux Falls has many nonstop hub connections (Chicago, Denver, Kansas City, Mexico City, Minneapolis, and Salt Lake). Both Sioux Falls and Sioux City have a wide range of airline choices which becomes a travel factor for frequent fliers.

Air passenger movement performance standards are not in place, and as earlier noted, should be established in cooperation with local agencies, airport operators, and airline officials. A key element for any standard to be established is the ability of the Department to monitor standard attainment without incurring significant new costs. Passenger loadings—minimums needed to maintain current levels of services and maximums feasible with current terminal facilities, costs and time to reach major hubs, and on-time services—are good candidates for general performance monitoring which are simple, easy to use, and for which information is currently available. Other possibilities which would require new data collections include time required for passengers to clear airports, availability of parking, baggage loss and damage, and maximum travel time and distances from points of origin to passenger air facilities. This type of information should be collected in response to identified problems rather than serving as routine performance standards.

> **RECOMMENDATION TWO. In close coordination with local airline, airport operating, and local agency officials, establish initial air passenger movement and airline operational standards by airport. Initial consideration should be given to minimum and maximum passenger movements, time and cost to reach major hubs, and on-time airline operations.**

Schedule performance records (on-time arrivals, departures, and cancellations), if adopted as standards, will require additional data collections and quarterly or monthly trend analyses (weather influences). Quarterly time and cost samplings for the nine airports will provide sufficient monitoring information if they are part of the adopted standard. The Department currently has available air passenger data to identify long-term maximum, average, and minimum passenger movements (some of which is presented in this report). That information plus design capacity information should facilitate passenger movement standards setting. Current monthly reporting of passenger movements should continue and will not involve additional costs.

Chapter three showed the economic importance of the services sector and tourism to the State's economy. And one of the major concerns of Department personnel, also expressed in a few of the survey contacts, is the decline in air services and usage at the smaller airports. In general well designed and placed air service improvements can be expected to have strong economic impacts, high benefits, high improvement costs, and high likelihood of positive payoffs.

> **RECOMMENDATION THREE. Continue the collection of passenger movements as is currently done and supplement those data collections as needed to monitor standards compliance. In addition, undertake, with the cooperation of local and airport officials, and the airlines, a special origin, destination, and travel cost study.**

The objectives of this study will be to identify where passengers travel from to reach four key airports, how they travel, how long it took, reasons for traveling, reasons for choosing the airport, and how they perceive the adequacy of current air services. The special study should include sampled information from airports at Sioux Falls, Rapid City, Pierre, and Aberdeen.

The first step of this special study should be to determine if the airlines currently have similar information they will be willing to share. We did not identify any in our survey, and the South Dakota Bureau of Tourism was not aware of any. The balance of the data collection should be designed accordingly.

The information collected through this special study should be of value to the airports and the airlines, as well as the Department and other State agencies, especially if all participants are afforded opportunities to collect additional data useful to them in their marketing and operating strategies. Cost sharing should add sufficient value to induce active participation by all parities—initial study design by the Department, together with data analyses, summarization, and reporting; forms distribution and collection by airline operating personnel; and data collection logistical support by the airports. This type of public- and private-sector cooperation represents the essence of the intent of ISTEA.

Data collections made in four 1-week periods (seven consecutive days), in each quarter of the year, should be sufficient to identify the information sought.

If the special study requires higher levels of data collection participation by the Department, it probably should be undertaken during the summer, when the Department has seasonal personnel who can do it with the least level of interruption to normal ongoing operations. In this case the necessary information would have to be collected through airport interviews and would not identify seasonal impacts.

The results of the special study should provide information as to the potential benefits that could be realized through improvements at the smaller airports. The study should also provide information of value in reviewing initial standards, as well as providing quality-of-service perception guidelines, and public opinions as to needed service improvements. Results, costs, and the ability to collect performance standard compliance information without it, should be used to determine the need to repeat the study or some of its elements in the future. It is unlikely that such studies would be warranted more frequently than once every five or ten years, especially given South Dakota's low population growth rate.

Freight and mail movements, incoming and outgoing weights, are compiled by the Department, but only for five of the larger airports. Some trend analyses are being done. While the Department is currently capturing the most significant airport freight and mail movements (99 percent of the five that report, in terms of tonnage, is at Sioux Falls and Rapid City), data collections should be extended to the nine airports with regularly scheduled commercial airline services. It is likely that the information already exists, through FAA reporting, and that it will simply require the opening of channels of communication.

Time, cost, initial origin, damage, loss, and on-time information for freight movements were not identified. However, despite interviewing several organizations that routinely ship by air freight, no issues were identified. The apparent performance standard is the weight of movements inbound and outbound, and cost. Unit costs are readily available from air shippers. Others, as noted above, will require additional reporting.

> **RECOMMENDATION FOUR. Continue the collection of air freight and mail information from the currently reporting five airports. Expand the data collection to include all nine air carriers. Meet with key local personnel (airport, shippers, local government, associations) to establish air freight performance standards by airport. Initially consider minimum and maximum weight, and unit cost to hubs.**

Information does exist as to the commodities being shipped by air. We do not recommend that the Department routinely and globally collect or monitor the information.

Airport Access pavement and bridge evaluations are currently done, but there is a need to ensure that all pavements, both those at the airports (runway and taxi pavements) and their access roads and bridges are covered by pavement and bridge management systems. High levels of improvement and evaluation coordination will need to be established as the Department implements ISTEA's PMS and BMS requirements with local agencies of government. Concepts and programs used in establishing the PMS need to include airport pavements not currently covered by adequate systems, as well as airport access roads.

It was noted, during our interviews, that economies can be achieved in airport access road rehabilitation and improvement through better levels of coordination with the Department's overall highway improvement program. Access roads are frequently relatively short sections. Packaging needed improvements with larger nearby contracts can yield significant savings.

> **RECOMMENDATION FIVE. Ensure that pavement management and bridge management systems coverage extends to airport access roads and airport pavements. Integrate access road improvements into regular highway programming and contracting processes where it is feasible and cost effective to do so.**

Aviation-related databases, other than access roads, are currently within Aeronautics. The primary electronic application, within the unit, is for the airport master plans. The Department is in the process of implementing a GIS (geographical information system). Inclusion of the master plans into this system is certainly desirable, but of a lower priority than the highway system, since Aeronautics' current, CADD-based system, is operating satisfactorily.

The Department's pavement management system database is currently within Planning. The location of the emerging bridge management system is yet to be determined. Reports of results of PMS and BMS evaluations of aviation-related facilities should be routinely provided to Aeronautics. For roads not evaluated by the Department, reporting by local government should be established in accordance with guidelines adopted for other local roads, with copies of air-related facility evaluations being provided to Aeronautics.

Responsibilities for new data collections and the entry and maintenance of the resulting databases are discussed in the organization section.

Rail

The primary rail-related issues identified through our survey were the condition of the track, with resulting slow operating speeds in some locations; the effectiveness, efficiency, and responsiveness of the railroads themselves; the availability of cars and the locomotives to get them where they are needed; the future of grain-handling facilities (unit train facilities) as well as current capacities and operating volumes; the high cost of upgrading sections with low operating speeds that frequently have a large number of small bridges; and the general ability of the Department to compile the information needed to satisfy IMS and other management system requirements. The absence of rail passenger services seems to be accepted as an economic reality.

Inventories of rail facilities and conditions for both State-owned and private facilities, are in place, and condition ratings of state-owned track are routinely made by the Department. Many types of rail maps (current, historical, maximum, operating lines, threatened, density, ownership, etc.) are prepared within Planning. In addition, inventories and maps are currently available that show the lo-

cations of unit train grain-loading facilities, elevators, and livestock auction points (the latter classified by size).

Emphasis in the inventory is placed on the condition of the rail system, particularly its load-carrying capacity, condition trends, and condition improvements.

The perceived primary rail inventory weakness is a lack of knowledge about the capacities of known intermodal facilities, especially grain facilities. While the capacities of individual facilities is not currently known, tonnage movements, as discussed below, are known for the lines, and raw data are available for individual stations.

Rail freight movements generate a great deal of information, much of it currently compiled by the Department. External potential sources of freight information are shown, in some detail, in chapter three. Information within the Department is currently available that shows tonnage origin and destination within the State by loading and unloading station, and maximum loads. The primary freight movement analysis is currently made by line, rather than station, with some commodity analyses being done for agricultural products. As with air freight we do not recommend the routine and global collection and analysis of commodity information for rail or other freight movements.

The apparent performance standards are unit shipping costs, transport time to major intermodal facilities such as Fargo, Minneapolis/St. Paul, and Dilworth, and select local market destinations. Other apparent standards of potential merit include wait time for the train arrival and make-up, and on-time performance. However, adoption of these standards will require new data collections with private sector reporting and should be avoided except on a project-specific basis.

RECOMMENDATION SIX. Convene a panel of rail officials, unit train and elevator operators, and producers of products typically shipped by rail (concrete, cement, grain) to consider and establish initial performance standards. Initially consider unit shipping costs and trip time. It will probably be necessary to establish the standards by line for those using tracks currently classified as threatened or in need of assistance.

Some intermodal access roads, including a few unit train facilities, are not currently served by the State's Preferential Truck Network, as shown by the map presented in chapter three. As with the airport access roads, the Department will need to ensure that the access roads and bridges for at least the more significant facilities are covered through combinations of the Department's PMS and BMS, and local systems, the latter with result reporting to the Department.

Many rail-related issues were expressed during our survey. The problems identified are well known to the Department and have been the subject of aggressive corrective actions as evidenced by the state's purchase and rehabilitation efforts for abandoned lines, and continuing attention to difficult problems.

Transit and Intercity Buses

The Department currently compiles and analyzes a great deal of transit-related information. While current passenger, time, and cost standards were not identified, the information to develop them is readily available. The one element not known is connectivity to other modes of travel—airports and intercity bus lines. There were no issues in this regard that we identified. However, it is probable that connectivity will become more important as a greater proportion of the states population attains senior citizen status.

RECOMMENDATION SEVEN. Meet with transit, local government, and concerned association officials to explore and set transit-related performance standards

for factors currently analyzed as well as intermodal connections. Apparent standards for initial consideration are cost, frequency of service, and access to service.

Little is currently known about intercity bus service passenger movements or terminals. The three carriers currently serving South Dakota are known and route maps have been prepared. There are limited information sources currently available to expand the database. The PUC has a vehicle inventory, but the classification system used does not provide sufficient differentiation among vehicle types to be of value in meeting ISTEA requirements. Routes, schedules, and fares, however, can be identified from published schedules. Terminals and their capacities are not likely to be significant outside Rapid City and Sioux Falls. In the main they are restaurants and hotels where the bus companies have worked-out agreements. Capacities carried and their points of origin and destination have significant competitive implications; they represent the carriers' marketing and competitive strategies. Other states have encountered difficulties in attempts to collect this type of information.

Apparent standards include costs, trip time, and access to service. That type of information is currently available through printed schedules or phone calls to carriers, and if established as standards should be collected twice per year. Costs of new data collections, done on a semi-annual basis, will be minimal.

One comment about inadequate bus service was received during the survey. That may not be representative of the concerns within the State.

RECOMMENDATION EIGHT. Meet with bus officials, local agency officials, and interested organizations such as Chambers of Commerce to establish performance standards. Initially consider costs, trip time to and from key points (Rapid City to Pierre, Pierre to Huron, Huron to Aberdeen, etc.) and access to service based on population and service frequency.

Pipelines

Pipeline terminals and access roads are currently known and shown on maps. Their capacities and operating volumes are not currently available within the Department, but we do not believe the information is necessary except for project specific improvement evaluations. No rail terminals were identified; all terminals are currently served by trucks. No pipeline-related issues were identified in the survey.

Apparent performance standards are costs per unit, which can be expected to vary quite widely based on supply and demand, and terminal wait time, which can also be expected to vary as truckers wait for the desired product to be in the line.

All current terminals are near, as might be expected, to highways that are currently in the Preferential Truck Network. There are likely short connecting roads that should be covered by local pavement management systems.

RECOMMENDATION NINE. Meet with pipeline and trucker representatives to establish initial performance standards. Consider unit costs and terminal wait time. Ensure that connecting roads are covered by pavement management systems.

Oregon Service Level Examples

The Oregon Department of Transportation has established minimum service levels which should be of value, at least in some instances, as the Department considers establishing its own service level standards.

Minimum levels of multimodal intercity passenger service include:

- Intercity passenger services should be available between major urban areas.
- Market areas over 70 miles from a major commercial airport and over 50,000 population should have at least three minimum round trip connections available per day via intercity passenger nodes.
- Connections should be provided based on travel density in Interstate corridors to connect to places outside the state.
- Intercity passenger terminals should be served by local public transit services and by elderly and handicapped service providers.
- Intercity passenger terminals should be subject to public control to the extent that open access to all intercity carriers is available under non-discriminatory terms.
- To the extent possible, direct transfers should be available between intercity bus, air, rail, and airport limousine services and local transit services.

Intercity bus minimum levels of service include:

- Intercity bus services should be provided to connect all communities of over 2,500 persons (which are 20 miles or more from the nearest other intercity passenger services) to the nearest other cities of high order of importance or services, and should allow a round trip between those places to be made within a day.
- Intercity elderly and disadvantaged services should be coordinated with intercity bus and van services which are open to the general public.
- Intercity bus services should connect to local transit and to elderly and disadvantaged services.
- Bus passenger terminals should be publicly controlled to ensure that all carriers have access to the terminals under non-discriminatory terms.

Intercity air passenger service minimum levels of service include:

- Air service connections between major cities and other areas should be provided whenever commercially viable (three round trip planes per day of 19 passengers as a minimum measure of commercial viability) or whenever intercity air connections are more economic to subsidize than other modes.
- Basic commercial air service should be available to isolated urban areas. These areas are isolated because of topographic constraints, severe weather conditions, and distance from major urban areas. The area must have an airport service area population of more than 25,000, a central urban area of more than 15,000, be more than 50 miles from other commercial air services, and be more than 100 miles from a metropolitan area.

Highway freight minimum levels of service include:

- Highway freight accessing intermodal terminals should experience level of service C (based on Highway Capacity Manual levels of service where A represents free flow conditions and F heavily congested conditions) or better on highways during off-peak periods.
- Highways which have a high percentage of trucks, provide regional freight access, and handle long-distance traffic to out-of-state destinations should be designated as primary freight corridors and incorporated into corridor plans and projects.

Rail freight minimum levels of service include:

- Branch rail lines will be maintained to allow a minimum speed of operation of 25 miles per hour, whenever upgrading can be achieved with a favorable benefit-cost ratio.
- Rail main lines will provide convenient ramp, terminal, and reload facilities for transfers from truck to rail for long haul movement of freight. High quality highway access should be provided to these sites.
- Priority rights of way should be preserved for potential public use or ownership when abandonment proceedings are initiated.
- Reload facilities should be encouraged and supported as warranted, where they provide the most cost efficient and environmentally effective response to branch line abandonment.
- Non-discriminatory access should be provided to and from all reload facilities.

Economic Analyses and Models

Freight planning is a matter of concern for all transportation agencies. There seems to be general consensus among planners that it will take some time for state DOTs to refine management systems and planning processes, and to develop and refine useful economic models, especially for freight forecasting. However, there is also a general consensus that planning can be improved, and IMS goals can be advanced, with the tools currently at hand.

The most comprehensive review of freight planning we found is the ongoing NCHRP Project 8-30. An Interim Report was prepared in August 1993. It is recommended reading. We have drawn liberally from this report for the contents of this section.

The report divides existing forecasting procedures into two basic types, a structural approach and a direct approach. The structural approach . . . "begins with an economic forecast of the production and consumption of goods and the flows of different types of commodities between specific origins and destinations. A base case commodity flow matrix is first developed to provide information on current volumes and flows of traffic. A variety of options are available to move from the base year to the future year matrix."[5] This approach may use macroeconomic forecasts available from government and private sources, and usually involves determining modal splits with models. The researchers conclude that while much has been written about the structural approach . . . "it has found little application in state freight forecasting. The procedure is complex and requires significant expertise and expenditure of resources."[6]

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[5] NCHRP Project 8-30, Interim Report, Characteristics and Changes in Freight Transportation Demand, August 1993, p. 2-95.

[6] Ibid., p. 2-97.

The second basic approach, the direct approach, makes simplifying assumptions that limit complexity, and are time series based. They are often the best currently available. "An extensive literature exists on more or less formal techniques for such time series analysis. Of course, one can start with simple procedures such as graphing past trends and eyeballing, or trending past trends. One can also use more sophisticated techniques such as moving average models, ARIMA models, and the like. Statistical packages such as SAS and SPSS will allow the user access to these tools."[7]

The overriding conclusion is that at this point in time "there is no single publicly available freight database that can be used to address a large share of the freight information and forecasting needs of public agencies across the nation."[8]

Prospects for Payoff

Intermodal issues impacting economic development and amenable to financially responsible and economically feasible solutions seem most likely to occur in the following areas:

- unit train loading facilities and access for agricultural products;
- air passenger terminal access and facilities for Rapid City and Sioux Falls; and
- air freight terminal access and facilities, also at Rapid City and Sioux Falls.

The general model shown on the next page, Figure 4-1, summarizes the likely intermodal economic impacts for the Department by type of potential improvement.

[7] Ibid., p. 2-98.

[8] Ibid., p. 2-99.

Figure 4-1
Prospects for Economic Payoff

Type of Intermodal Investment or Connection	Likely Strength of Economic Impact	Expected Magnitude		Likelihood of Positive Payoff
		Benefits	Costs	
Passenger air service improvements	Strong	High	High	High
Transit access improvements	Weak	Moderate	Moderate	Moderate
Intercity bus to local bus or taxi	Weak	Low	Low	Low
Intercity rail to local bus	Weak	Not applicable	Not applicable	Not applicable
Unit train facility improvements	Strong	High	Low	High for railroads Questionable for DOT
Upgrade rail freight line	Strong	Project specific	Project specific	Project specific
Improve air freight facilities	Strong	High	High	High
Rail line abandonment	Strong	Project specific	Project specific	Adverse
Rail line consolidation	Strong	Project specific	Project specific	Adverse

Organization

The proposed IMS organization, which takes into consideration other management systems but does not necessarily provide a complete structure for them, is presented by mode in the paragraphs that follow. These are the guiding concepts used in assigning recommended authorities and responsibilities.

- IMS goals and objectives can be achieved within the current organizational structure of the Department. Key responsibilities should be assigned to the Division of Planning, and the Division of Air, Rail, and Transit. The Division of Operations should continue to have construction management and supervisory responsibilities, and to assist with field data collections as time and skill demands allow.
- On-site, IMS-related field data collections, other than those requiring special skills and equipment, should be under the direction of a single unit to ensure that field trips are not unnecessarily duplicated and that data collections are fully coordinated. The implementation of this guideline will change the scope of operations of some units, change some current basic responsibilities and authorities, and help to institutionalize some data collections that are currently undertaken on an ad-hoc basis.

- Basic responsibilities for database updating and management should not change for data collection extensions required for IMS (pavement management, bridge management, etc.) unless these changes are made in response to other ISTEA requirements. Implementation of this guideline will preserve the integrated database concept, minimize data collections and redundancies, and improve accuracy.
- High levels of coordination and cooperation currently appear to exist. New relationships will need to be established and all will need to be reconfirmed or strengthened.
- Outreach programs and public contacts should have consistent Department representation by people with titles that are meaningful to the public, insofar as that can reasonably be done. So doing will facilitate internal routing of communications and searches by the public to find the proper person to talk to (a problem some other states have noted that have functional rather than modal forms). Working titles should be used, with external contacts, that are more descriptive than personnel classification titles (Aeronautics Engineer vs. Transportation Engineer).

Aviation

Most of the recommended authority and responsibility structure for the Aeronautics unit of the Division of Air, Rail, and Transit is within their current scope of operations. The primary exceptions are the development and monitoring of performance standards. The recommendation is that while Aeronautics develop related standards, Planning should have review authority. That is necessary in our view to maintain consistency and compatibility among standards as the various requirements of ISTEA are implemented, and as the Department undertakes other system improvements.

RECOMMENDATION TEN. Aeronautics should have continuing responsibilities for developing and recommending aviation policies, and procedures; developing and maintaining freight and passenger facility inventories and operating volumes; preparing and monitoring improvement and safety programs; monitoring and evaluating performance; developing and recommending long-term plans; and identifying the need for and recommending techniques to be used in the completion of special studies. In addition the unit should strengthen its external outreach program; prepare and recommend performance standards; monitor standards compliance; and ensure, in an oversight capacity, that access roads and airport pavements are periodically evaluated through PMS and BMS.

Figure 4-2, on the next page, presents a summary of the activities and system elements for which the Aeronautics unit of DART should be responsible.

Figure 4-2

Recommended Summary
IMS Aviation-Related
Authority and Responsibility Structure

	Division of Air, Rail, and Transit			Division of Planning	
Activity and System Element	Aeronautics	Railroads	Public Transit	Inventory	Planning and Programs
Policy and Procedure Recommendations	X				
Freight and Passenger Facility Inventories	X				
Freight and Passenger Capacity Estimates (if required by adopted standards)	X				
Freight and Passenger Operating Volumes	X				
Master/Layout Plans	X				
Access Road Inventories	Oversight			X	
Pavement and Bridge[9] Evaluations	Oversight			X--Pavements	
Performance Standards	X--Develop				X--Review
Improvement and Safety Programs	X--Develop				X--Review
Long-Term Plans	X--Develop				X--Review
Performance Monitoring and Evaluations	X				
User Relationships and Outreach	X				
Special Studies	X				

[9] The organizational placement for the bridge management system has not yet been determined.

Those which remain essentially unchanged are:

- aviation-related policy and procedure developments and recommendations to the Division Director;
- freight and passenger facility inventories;
- freight and passenger operational volume data collections and reporting, with the recommended expansion of freight reporting to all nine passenger service airports;
- preparation and maintenance of the airport master/layout plans;
- coordination, preparation, and monitoring of safety and improvement programs, which should be integrated into the Department's comprehensive improvement program by the Division of Planning; and
- performance and safety monitoring and evaluations.

Airport pavements and access roads are currently monitored by Aeronautics. The added dimension will be the necessity to ensure they are covered by either Department or local pavement, bridge, and traffic management systems, and that needed reports and evaluations are done in a timely manner. To ensure adequacy and consistency, and to avoid the duplication of skill and equipment demands, PMS evaluations and the establishment of coordination programs with local government should be a responsibility of the Division of Planning. The bridge management system should be handled in the same way after the basic organizational responsibility for its placement has been determined. Aeronautics should monitor to ensure coverage and that inventories and evaluations are current.

Coordination of access road improvements with other highway improvements within the vicinity is an improvement need the unit identified, and is working toward.

New responsibilities of Aeronautics include:

- developing and recommending performance standards, although to ensure consistency among all standards and systems (non-IMS as well as IMS), these recommendations should have the review and concurrence of the Division of Planning;
- developing freight and passenger airport capacity estimates for the nine airports with regular commercial airline services, if capacity is incorporated into the performance standard; and
- designing and implementing record systems needed to determine compliance with performance standards, and developing improvement recommendations.

Rail

Recommendations made in drafts of this report anticipated significant expansions in the responsibilities of the Rail unit within DART. Limited abilities to acquire additional staff, as described by every Department official with whom we discussed the recommendations, caused us to reduce the recommended authorities and responsibilities for this unit, and as discussed later in this chapter, the recommended staffing plan.

High levels of coordination and cooperation have existed between the rail function, in its various organizational locations, and the Division of Planning. The recommended organizational structure anticipates the continuation of this highly coordinated relationship.

RECOMMENDATION ELEVEN. When data were collected for this project the Rail Unit's primary scope was state-owned track. DART, under the recommended organizational scheme, will have primary responsibility for the Department's intermodal outreach program which will include standards setting and performance monitoring. We recommend that the Rail unit also assume these responsibilities together with its traditional scope. The balance of IMS activities should be completed by the Planning Division, with the continuing high levels of coordination with Rail and DART that have existed in the past.

The recommended structure of rail-related authorities and responsibilities is shown on the next page as Figure 4-3. Major elements are:

- Railroads should take the lead in developing rail-related policy and procedure recommendations for state-owned facilities. The Division of Planning should have policy and procedure development responsibilities for privately owned facilities. All developments should continue to be made with the close coordination and cooperation of both Divisions.
- Railroads, in DART, should continue to have state-owned facility inventory and condition evaluation responsibilities. Other rail facility inventories, and the establishment and maintenance of the rail database, should be the responsibility of Transportation Inventory in the Division of Planning. Railroads, and Planning and Programs, should help guide database design and both should have ready access and oversight responsibilities. The implementation of this recommendation should be phased. The first priority should be the privately-owned-lines inventory, then the State-owned lines.
- Freight movement data collections should become the responsibility of the Inventory unit, with freight movement analyses being completed by Planning and Programs, as has been done in the past.
- The development of rail performance standards for both state and privately owned rail facilities should be the responsibility of Railroads. Planning and Programs should assist and review for consistency and compatibility with non-IMS systems. Standards performance monitoring, evaluations, and corrective measures should also be the responsibility of Railroads with the assistance of Planning and Programs. And Railroads should have the primary responsibility for establishing and maintaining external relationships with customers, users, associations, etc.
- Improvement programming for state-owned facilities should be developed by Railroads and integrated into overall plans and programs by Planning and Programs. Long-term rail improvement planning should be the responsibility of Planning and Programs with the assistance and overview of Railroads.
- Identifying the need for special studies and the techniques to be employed should be the responsibility of Railroads for state-owned track, and Planning and Programs for the other facilities.

Figure 4-3
Recommended Summary
IMS Rail-Related
Authority and Responsibility Structure

	Division of Air, Rail, and Transit			Division of Planning	
Activity and System Element	Aeronautics	Railroads	Public Transit	Inventory	Planning and Programs
Policy and Procedure Recommendations		X--State owned			Concurrence X--Others
Facility Inventories		X--State owned		X--Others	Oversight
Facility Database		Oversight--state owned		X	Oversight--others
Condition Evaluations		X--State owned		X--Others	Oversight
Lease Management		X			
Freight Movement Data Collections				X	Assistance
Freight Movement Analyses		Assistance			X
Access Road and Crossing Inventories		Oversight--state owned		X	Oversight--others
Access Road and Crossing Evaluations		Oversight--state owned		X	Oversight
Performance Standards		X			X--Review
Improvement Programs		X--State owned			X--Review X--Others
Long-Term Plans		Oversight			X
Performance Monitoring, Evaluations		Assistance			X
User Relationships and Outreach		X			Assistance
Special Studies		X--State owned			X--Others

Transit and Intercity Buses

The recommended IMS authority and responsibility structure for transit and intercity buses follows the same pattern as those recommended for Aeronautics and Railroads.

RECOMMENDATION TWELVE. Public Transit should have the authority and responsibility to initiate all transit and intercity bus policy and procedure developments, performance standard developments, data collections, user outreach initiatives, and program and plan developments. Planning and Programs should review standards to ensure compatibility, and review and incorporate improvement plans and programs into consolidated documents.

Figure 4-4, below, summarizes the recommended IMS structure for transit and intercity bus operations and developments.

Figure 4-4

Recommended Summary
IMS Transit and Intercity Bus-Related
Authority and Responsibility Structure

	Division of Air, Rail, and Transit			Division of Planning	
Activity and System Element	Aeronautics	Railroads	Public Transit	Inventory	Planning and Programs
Policy and Procedure Recommendations			X		Concurrence
Transit Data Collections			X		
Intercity Bus Routes			X		
All Related-Performance Standards			X--Develop		X--Review
Improvement Programs			X--Develop		X--Review
Long-Term Plans			X--Develop		X--Review
Performance Monitoring, and Evaluations			X		
User Relationships and Outreach			X		
Special Studies			X		

The recommended structure provides:

- Public Transit should continue to have transit data collection responsibilities and expand their basic scope to include intercity buses.
- Public Transit should have the basic responsibility for developing and recommending transit and intercity bus policies and procedures. However, these recommendations should have the concurrence of Planning and Programs.
- The development of transit and intercity performance standards, and maintaining identification of intercity bus routes, should be the responsibility of Public Transit. As with the other units, compatibility, consistency, and integration will require the review and approval of Planning and Programs.
- Public Transit should have performance monitoring, customer relationships, and outreach responsibilities.

Other Intermodal Facilities

Planning and Programs is currently the focal point for intermodal developments, data collections, and analyses, as well as overall programs and plans development. That is a circumstance that will need to continue as the IMS is developed and as units assume new authorities and responsibilities. It is also a service the unit will need to continue to provide to the Department for facilities and issues such as:

- pipelines and terminals;
- tribal lands and concerns;
- bikeways, walkways and similar miscellaneous facilities;
- economic and modeling evaluations and applications; and
- general planning and programming assistance.

Staffing

After initial recommendation reviews with key Department officials the recommended staffing plan was greatly reduced, as were the activities anticipated to be completed by DART, especially by its Railroad unit. The change was made in response to the reality the Department faces in attempts to secure new permanent positions, and the lack of support for the proposed staffing plan.

Initial recommendations shifted more of the IMS workload from the Division of Planning to DART than is anticipated in the final recommendations. The Planning Division, and especially Planning and Programming, will continue to have a significant IMS workload, especially for railroads. As other ISTEA requirements are addressed we believe that staffing will become an issue, especially if bridge management and congestion management become Planning Division responsibilities.

Aeronautics has existed, as currently staffed, for some time. Technical personnel potentially available to help assume the additional responsibilities of the unit include five engineers, a draftsman, and an aviation services manager. Much of the additional IMS-related work for this unit will revolve around performance standards setting, expanded freight evaluations, performance monitor-

ing, outreach and the identification of improvement opportunities or bottlenecks, and the design and implementation of the recommended air passenger origin and destination study.

The scope of operations for Railroads is expanded, but less than originally recommended. Much of the rail-related work completed by the Planning Division will necessarily continue within that unit. Major new work elements for the Railroad unit will include establishing the outreach program; identifying improvement opportunities or bottlenecks; establishing performance standards; and collecting, or organizing from materials collected by others, the monitoring information necessary to identify and evaluate standards compliance. This unit currently has one person.

Public Transit currently has three people. Their responsibilities will include the continuation of work previously done within Planning with a scope expansion to include intercity buses and the fulfillment of ISTEA data collection and analyses requirements—performance standards, capacity estimates (if required by the standards adopted), and outreach for both transit and intercity bus providers and users.

Our initial recommendation was that six additional people be acquired—four for the Division of Air, Rail, and Transit, and two for the Planning Division. Planning has already hired one person and because we are convinced that the original recommendation will not be implemented, we reduced the recommended additional staff to one person.

> **RECOMMENDATION THIRTEEN. One additional person should be acquired for the Division of Air, Rail, and Public Transport. That person should be assigned to the Railroad unit. Sufficient flexibility should be maintained in assignments so that this person can assist in helping to establish outreach programs and standards in the other units of the Division.**

The primary assignments of the additional staff member for DART should be in its Railroad unit. Expected work accomplishments should include establishing the rail outreach program with transportation providers and users; setting performance standards which will probably need to be established by line for those that are in need of assistance; collecting and analyzing information to determine standards compliance; refining and improving the standards as shown to be needed in the future; identifying improvement opportunities and bottlenecks, and designing special studies to address them; reviewing, evaluating, and recommending the adoption of IMS-related research and federal guidelines; preparing policy and procedure recommendations; preparing proposed improvement programs and budgets; and providing oversight reviews for state-owned facility inventories and databases.

In addition this person, who should have good interpersonal skills and communicating capabilities, should assist the other units in DART in establishing their outreach programs, and assisting in their standards setting, as needed and as time will allow.

Appendix

This appendix contains: a listing of recommendations; population data for all South Dakota counties; a listing of information sources; and inventories of intermodal facilities by location. .

Listing of Recommendations

RECOMMENDATION ONE. The recommended basic structure for the Department's Intermodal Management System is:

1. Establish separate systems for freight and people movements.
2. Establish general performance standards by mode for those involving intermodal movements. Involve transportation users and providers in both the private and public sectors in establishing the standards. Avoid commodity based standards. Use ones that will provide "transportation pulse rates" that will help to identify improvement opportunities and bottlenecks. Avoid, insofar as possible, new data collections for monitoring at this level.
3. Monitor general economic activities at the state, sector level, and subsector level for those sectors showing growth or improvement opportunities.
4. Undertake detailed studies when improvement opportunities and bottlenecks are identified. At this level invoke traditional conceptual planning guidelines—detailed inventories as they are needed, condition surveys and deterioration models, action and cost models, and performance impacts.
5. Continue and strengthen lines of communication with transportation providers and users. Actively seek definitions of improvement opportunities from their perspectives

RECOMMENDATION TWO. In close coordination with local airline, airport operating, and local agency officials, establish initial air passenger movement and airline operational standards by airport. Initial consideration should be given to minimum and maximum passenger movements, time and cost to reach major hubs, and on-time airline operations.

RECOMMENDATION THREE. Continue the collection of passenger movements as is currently done and supplement those data collections as needed to monitor standards compliance. In addition, undertake, with the cooperation of local and airport officials, and the airlines, a special origin, destination, and travel cost study.

RECOMMENDATION FOUR. Continue the collection of air freight and mail information from the currently reporting five airports. Expand the data collection to include all nine air carriers. Meet with key local personnel (airport, shippers, local government, associations) to establish air freight performance standards by airport. Initially consider minimum and maximum weight, and unit cost to hubs.

RECOMMENDATION FIVE. Ensure that pavement management and bridge management systems coverage extends to airport access roads and airport pavements. Integrate access road improvements into regular highway programming and contracting processes where it is feasible and cost effective to do so.

RECOMMENDATION SIX. Convene a panel of rail officials, unit train and elevator operators, and producers of products typically shipped by rail (concrete, cement, grain) to consider and establish initial performance standards. Initially consider unit shipping costs and trip time. It will probably be necessary to establish the standards by line for those using tracks currently classified as threatened or in need of assistance.

RECOMMENDATION SEVEN. Meet with transit, local government, and concerned association officials to explore and set transit-related performance standards for factors currently analyzed as well as intermodal connections. Apparent standards for initial consideration are cost, frequency of service, and access to service.

RECOMMENDATION EIGHT. Meet with bus officials, local agency officials, and interested organizations such as Chambers of Commerce to establish performance standards. Initially consider costs, trip time to and from key points (Rapid City to Pierre, Pierre to Huron, Huron to Aberdeen, etc.) and access to service based on population and service frequency.

RECOMMENDATION NINE. Meet with pipeline and trucker representatives to establish initial performance standards. Consider unit costs and terminal wait time. Ensure that connecting roads are covered by pavement management systems.

RECOMMENDATION TEN. Aeronautics should have continuing responsibilities for developing and recommending aviation policies, and procedures; developing and maintaining freight and passenger facility inventories and operating volumes; preparing and monitoring improvement and safety programs; monitoring and evaluating performance; developing and recommending long-term plans; and identifying the need for and recommending techniques to be used in the completion of special studies. In addition the unit should strengthen its external outreach program; prepare and recommend performance standards; monitor standards compliance; and ensure, in an oversight capacity, that access roads and airport pavements are periodically evaluated through PMS and BMS.

RECOMMENDATION ELEVEN. When data were collected for this project the Rail Unit's primary scope was state-owned track. DART, under the recommended organizational scheme, will have primary responsibility for the Department's intermodal outreach program which will include standards setting and performance monitoring. We recommend that the Rail unit also assume these responsibilities together with its traditional scope. The balance of IMS activities should be completed by the Planning Division, with the continuing high levels of coordination with Rail and DART that have existed in the past.

RECOMMENDATION TWELVE. Public Transit should have the authority and responsibility to initiate all transit and intercity bus policy and procedure developments, performance standard developments, data collections, user outreach initiatives, and program and plan developments. Planning and Programs should review standards to ensure compatibility, and review and incorporate improvement plans and programs into consolidated documents.

RECOMMENDATION THIRTEEN. One additional person should be acquired for the Division of Air, Rail, and Public Transport. That person should be assigned to the Railroad unit. Sufficient flexibility should be maintained in assignments so that this person can assist in helping to establish outreach programs and standards in the other units of the Division.

South Dakota Population
Selected Years

County	Population				Percent Per Annum Growth Rates			
	1940	1970	1980	1990	1940-70	1970-90	1980-90	1940-90
Aurora	5,387	4,183	3,628	3,135	-0.840	-1.432	-1.450	-1.077
Beadle	19,648	20,877	19,195	18,253	0.202	-0.669	-0.502	-0.147
Bennett	3,983	3,088	3,044	3,206	-0.845	0.188	0.520	-0.433
Bon Homme	10,241	8,577	8,059	7,089	-0.589	-0.948	-1.274	-0.733
Brookings	16,560	22,158	24,332	25,207	0.975	0.647	0.354	0.844
Brown	29,676	36,920	36,962	35,580	0.731	-0.185	-0.380	0.364
Brule	6,195	5,870	5,245	5,485	-0.179	-0.339	0.448	-0.243
Buffalo	1,853	1,739	1,795	1,759	-0.211	0.057	-0.202	-0.104
Butte	8,004	7,825	8,372	7,914	-0.075	0.057	-0.561	-0.023
Campbell	5,003	2,866	2,243	1,965	-1.840	-1.869	-1.315	-1.852
Charles Mix	13,449	9,994	9,680	9,131	-0.985	-0.451	-0.582	-0.771
Clark	8,955	5,515	4,894	4,403	-1.603	-1.120	-1.052	-1.410
Clay	592	12,923	13,689	13,186	10.824	0.101	-0.374	6.403
Codington	17,014	19,140	20,885	22,698	0.393	0.856	0.836	0.578
Corson	6,755	4,994	5,196	4,195	-1.002	-0.868	-2.117	-0.948
Custer	6,023	4,698	6,000	6,179	-0.825	1.380	0.294	0.051
Davison	15,336	17,319	17,820	17,503	0.406	0.053	-0.179	0.265
Day	13,565	8,713	8,133	6,978	-1.465	-1.104	-1.520	-1.321
Deuel	8,450	5,686	5,289	4,522	-1.312	-1.139	-1.555	-1.243
Dewey	5,751	5,170	5,336	5,523	-0.354	0.331	0.345	-0.081
Douglas	6,348	4,569	4,181	3,746	-1.090	-0.988	-1.093	-1.049
Edmunds	7,814	5,548	5,159	4,356	-1.135	-1.202	-1.678	-1.162
Fall River	8,089	7,505	8,439	7,353	-0.249	-0.102	-1.368	-0.191
Faulk	5,168	3,893	3,327	2,744	-0.940	-1.734	-1.908	-1.258
Grant	10,552	9,005	9,013	8,372	-0.527	-0.364	-0.735	-0.462
Gregory	9,554	6,710	6,015	5,359	-1.171	-1.118	-1.148	-1.150
Haakon	3,515	2,802	2,794	2,624	-0.753	-0.328	-0.626	-0.583
Hamlin	7,562	5,520	5,261	4,974	-1.044	-0.519	-0.559	-0.834
Hand	7,166	5,883	4,948	4,272	-0.655	-1.587	-1.458	-1.029
Hanson	5,400	3,781	3,415	2,994	-1.181	-1.160	-1.307	-1.173
Harding	3,010	1,855	1,700	1,669	-1.601	-0.527	-0.184	-1.173
Hughes	6,624	11,632	14,220	14,817	1.895	1.217	0.412	1.623
Hutchinson	12,668	10,379	9,350	8,262	-0.662	-1.134	-1.229	-0.851
Hyde	3,113	2,515	2,069	1,696	-0.709	-1.951	-1.968	-1.207
Jackson	1,955	1,531	3,437	2,811	-0.812	3.085	-1.991	0.729

South Dakota Population
Selected Years

	Population				Percent Per Annum Growth Rates			
County	1940	1970	1980	1990	1940-70	1970-90	1980-90	1940-90
Jerauld	4,752	3,310	2,929	2,425	-1.198	-1.544	-1.871	-1.336
Jones	2,509	1,882	1,463	1,324	-0.954	-1.743	-0.993	-1.270
Kingsbury	10,831	7,657	6,679	5,925	-1.149	-1.274	-1.191	-1.199
Lake	12,412	11,456	10,724	10,550	-0.267	-0.411	-0.163	-0.325
Lawerence	19,093	17,453	18,339	20,655	-0.299	0.846	1.196	0.157
Lincoln	13,171	11,761	13,942	15,427	-0.377	1.366	1.017	0.317
Lyman	5,045	4,060	3,864	3,638	-0.721	-0.547	-0.601	-0.652
McCook	9,793	7,246	6,444	5,688	-0.999	-1.203	-1.240	-1.081
McPherson	8,353	5,022	4,027	3,228	-1.682	-2.186	-2.187	-1.884
Marshall	8,880	5,965	5,404	4,844	-1.318	-1.035	-1.088	-1.205
Meade	9,735	17,020	20,717	21,878	1.880	1.263	0.547	1.633
Mellette	4,107	2,420	2,249	2,137	-1.748	-0.620	-0.510	-1.298
Miner	6,836	4,454	3,739	3,272	-1.418	-1.530	-1.325	-1.463
Minnehaha	57,697	95,209	109,435	123,809	1.684	1.322	1.242	1.539
Moody	9,341	7,622	6,692	6,507	-0.676	-0.788	-0.280	-0.720
Pennington	23,799	59,349	70,361	81,343	3.093	1.589	1.461	2.489
Perkins	6,585	4,769	4,700	3,932	-1.070	-0.960	-1.768	-1.026
Potter	4,614	4,449	3,674	3,190	-0.121	-1.650	-1.403	-0.735
Roberts	15,887	11,678	10,911	9,914	-1.021	-0.815	-0.954	-0.939
Sanborn	5,754	3,697	3,213	2,833	-1.464	-1.322	-1.251	-1.407
Shannon	5,366	8,198	11,323	9,902	1.423	0.949	-1.332	1.233
Spink	12,527	10,595	9,201	7,981	-0.557	-1.407	-1.412	-0.898
Stanley	1,959	2,457	2,533	2,453	0.758	-0.008	-0.320	0.451
Sully	2,668	2,362	1,990	1,589	-0.405	-1.963	-2.225	-1.031
Todd	5,714	6,606	7,328	8,352	0.485	1.180	1.317	0.762
Tripp	9,937	8,171	7,268	6,924	-0.650	-0.825	-0.484	-0.720
Turner	13,270	9,872	9,255	8,576	-0.981	-0.701	-0.759	-0.869
Union	11,675	9,643	10,938	10,189	-0.635	0.276	-0.707	-0.272
Walworth	7,274	7,842	7,011	6,087	0.251	-1.259	-1.403	-0.356
Yankton	16,725	19,039	18,952	19,252	0.433	0.056	0.157	0.282
Ziebach	2,875	2,308	2,308	2,220	-0.730	-0.194	-0.388	-0.516
State Totals	642,961	666,257	690,738	696,004	0.119	0.219	0.076	0.159
United States (millions)			283,126	350,000			2.143	

Source: 1990 Census of Population and Housing

Listing of Information Sources

General Information Sources

1. IMS Requirements, Federal Register, Volume 58, Number 229, currently available in the Department

2. South Dakota Gross State Product, Business Research Bureau, University of South Dakota, less than $50 per year

3. Exports by State of Origin of Movement, U.S. Census Bureau, Foreign Trade Division, less than $50 per year

4. Population, Census of Population and Housing, U.S. Census Bureau, less than $ 50

5. Employment, County Business Patterns, U.S. Census Bureau, less than $50 per year

6. County and City Data Book, U.S. Bureau of the Census, less than $50 per year

7. Assessment of Border Crossings and Transportation Corridors for North American Trade, Report to Congress, FHWA, currently available

8. ISTEA and Intermodal Planning: Concept, Practice, Vision, Special TRB Report 240, currently available

9. Data for Decisions: Requirements for National Transportation Policy Making, TRB Special Report 234, available

10. Transportation Planning, Programming, and Finance, TRB Circular Number 406, available

11. Transportation Data Needs: Programs for a New Era, TRB Circular Number 407, available

12. Tribal Lands inventory and map, Planning and Programs, available

13. Bike Trails and Parks inventory and map, Planning and Programs, available

14. Multimodal Transportation Approaches in Minnesota, and Multimodal Financial Planning from a Regional Perspective: A Guide for Decision Making, Transportation Research Record Number 1305, available

Truck and Freight Sources

15. Motor Freight Transportation and Warehousing Survey, Annual Update without state or regional data, Bureau of the Census, less than $50 per year

16. Truck/Trailer, Vehicle Registrations, and many other statistical analyses, annual updates, FHWA Highway Statistics, available

17. Freight Matters, Trucking Industry Guide to Freight and Intermodal Planning Under ISTEA, Trucking Research Institute, 2200 Mill Road, Alexandria, VA 22314, cost not known

18. 1993 Commodity Survey to be available in 1995, cost not known

19. Pipeline and Terminal inventory and map, Planning and Programs, available

20. Proposed National Highway System inventory and map, Planning and Programs, available

21. Preferential Truck System inventory and map, Planning and Programs, available

22. Livestock Auction facilities inventory and map, Planning and Programs, available

23. Highway Performance Monitoring System, Planning Division, available

Air Facilities

24. Air Passenger and Freight Movements, Reporting Airports, Aeronautics, available

25. Air Master/Layout Plans, Aeronautics, available

26. Air Schedules and Fares, Official Airline Guide (OAG), printed or available through electronic database services such as CompuServe (printed about $400 per year, a few cents per minute for usage time on CompuServe plus monthly cost per user of about $10).

27. Air Freight Delivery Schedules and Costs, Federal Express, and United Parcel Service, no cost

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Rail Facilities

28. Rail Freight Movements, Reporting Railroads, Planning and Programs, available

29. Maps and Inventories of Rail Facilities, Planning and Programs, available

30. Unit Train and Elevator inventory and maps, Planning and Programs, available

Bus and Transit

31. Intercity Schedules and Costs, Powder River, Jack Rabbit, Greyhound, no cost

32. Extensive data on transit operations and costs, Public Transit, available

Airports

The state has 74 airports—which includes one at Custer State Park which is state-owned. The following list of airports is organized by airport classification and location.

9 Air Carriers (regularly scheduled air passenger service)

Aberdeen	Brookings	Huron
Mitchell	Pierre	Rapid City
Sioux Falls	Watertown	Yankton

7 General Utility (all aircraft under 12,500 pounds)

Lemmon	Madison	Milbank
Mobridge	Pine Ridge	Vermillion
Winner		

16 Basic Utility II (95 percent of aircraft under 12,500 pounds)

Belle Fourche	Canton	Chamberlain	Desmet
Faith	Gettysburg	Hot Springs	Hoven
Lincoln County	McLaughlin	Parkston	Philip
Sisseton	Spearfish	Springfield	Webster

19 Basic Utility I (75 percent of aircraft under 12,500 pounds)

Bison	Britton	Buffalo	Clark
Custer County	Eagle Butte	Edgemont	Eureka
Faulkton	Flandreau	Gregory	Martin
Miller	Mission	Murdo	Platte
Refield	Wagner	Wall	

4 Landing Strips

Bowdle	Corsica	Mcintosh	Presho

18 Secondary

Arlington	Clear Lake	Custer State Park
Desmet	Dupree	Harrold
Herried	Highmore	Howard
Isabel	Kadoka	Kimbal

Lake Andes	Newell	Onida
Sturgis	Timber Lake	White River

1 Private (with public access)

North Sioux City

Rail

59 Unit Grain Loading Facilities (25 or more cars)

Alpena	Amherst	Arlington	Aurora	Bancroft
Beresford	Blunt	Bristol	Britton	Brookings
Canton	Chamberlain	Corson	Craven	Aberdeen
Crebner	Dimock	Emery	Fort Pierre	Garretson
Groton	Hawarden, IA	Highmore	Huron	Ipswich
Labolt	Lake Preston	Lemmon	Madison	Mansfield
Marion	McLaughlin	Mellette	Midland	Milbank
Mitchell	Northville	Onida	Parker	Philip
Rapid City	Redfield	Roscoe	Selby	Sisseton
Sisseton	St. Lawrence	Tripp	Tulare	Vermillion
Vienna	Wall	Warner	Watertown	Webster
Wentworth	Willow Lake	Wolsey	Yankton	